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Dating and Assessing the Recent Sediments of Three Deep Basins of the Baltic Sea: Indication of Natural and Anthropogenic Changes

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Abstract

During a 3-years EU-MAST-3 project (Baltic Sea System Study, BASYS), short and long (> 5 m) sediment cores were collected from 3 deep basins of the Baltic Sea: Bornholm Basin, Gotland Basin and North Central Basin. As part of a paleoenvironmental study, lead-210 dating and geochemical data were generated at the Gamma Dating Center (GDC) of the Risø National Laboratory.

Dating of cores from the Bornholm Basin was generally hampered by the fact that lead-210 and Cs-137 depth profiles suggest disturbed sediment surfaces probably caused by human activity (e.g., trawling). Sedimentation rates are therefore in excess of 5 mm/a. The sediments from the North Central Basin exhibit the lowest rates, between 1 and 2 mm/a, while the rates for the Gotland Basin were at 2-3 mm/a.

All the short core and long box core chemical analyses were used in the paleoenvironmental interpretations. From the large geochemical data base, however, only a few elements were chosen for more detailed discussions.

Ca and Mn covary perfectly throughout the whole marine section of a long box core from the Gotland Basin. Ca-Mn accumulations are ascribed to the mineral rhodochrosite. Rhodochrosite formation is thought to be coupled to saltwater inflows in that oxygen and HCO_3^- rich saltwater converts bacterially re-dissolved Mn^{2+} into the carbonate mineral.

For the upper 1.5 m of the Gotland Basin, there is a clear indication for cyclic rhodochrosite deposition in that about 300 year long periods with relatively high Ca-Mn are followed by about 300 years lasting sections with low Ca-Mn. Presently, a coupling to trangressional/regressional phases (sealevel change) in the Baltic is favoured to explain the cyclicity.

Mo accumulations with peak values exceeding 300 mg/kg are found in all cores from the three deep basins. Mo has previously been used as an anoxicity indicator in Baltic Sea sediments, but there is strong evidence that Mo is coupled with the biogenic phase in the sediments because there is a strong correlation with, e.g. organic carbon and total nitrogen.

The Mo transport to the seafloor is thought to be coupled with the nitrogen fixation processes by cyanobacteria being known for their need of Mo as central element in the nitrogen fixing enzyme. Mo is finally settling with biogenic remains or in remnants of their grazers. It is worthwhile to mention that it is usually the uppermost flocculated sediment surface layer that shows high Mo in all three basins, but Mo accumulation does also occur at 1 m depth in the Gotland Basin box core and longer down in the core, suggesting that cyanobacterial blooms extracting Mo from seawater have occurred earlier in time. The question then is whether the present-day accumulations are a natural phenomenon or caused by eutrophication.

Taking the occurrences of laminated and thickly bedded sediments, based on the C_{org} and Mo data being coupled with the Mo behaviour, a different model of the formation of laminated and homogeneous sediments in the Baltic Sea is proposed

A well-stratified water column and sufficient supply of nutrients leads to algal blooming in the central Baltic. Cyanobacterial blooms require however a distinct and relatively constant salinity range because such blooms are usually not observed in the more saline North Sea. Blooming periods generate finely laminated sediments by settling of larger flocs of biogenic remains on the seafloor. In periods of increased wind forcing (normal conditions in the central Baltic), a relatively thick and well-ventilated surface water layer is formed with normal primary production. Particle transport to the seafloor is then restricted and more homogeneous sediments are deposited.

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Contents

Preface

This report describes in detail the work carried out within the three-years European Union research project under the heading Marine Science and Technology (MAST 3). The project work was part of the subproject "The paleo-environment based on the study of deep basin sediments" within the Regional Seas project "Baltic Sea System Study (BASYS, MAS3-CT96-0058). This project involved some 70 principal partners from 13 countries around the Baltic Sea being coordinated by the Baltic Sea Research Institute in Warnemünde, Germany. The present subproject work was coordinated by the Finish Geological Survey.

1 Introduction

During the past years there has been renewed focus on the Baltic Sea. Not only because the Baltic is one of the world's largest estuarine systems but also because the area is of focal importance for 15 countries as a transportation channel, recreational area and fishing ground. The Baltic Sea area's advantage when planning scientific work is that it is also relatively easily accessible. The fact that the Baltic Sea has been studied for many years and that a new political situation has been established since 1989 with new possibilities for international cooperation, was the basis for a new effort to include the Baltic Sea seafloor into a multidisciplinary project.

Through the EU Marine Science and Technology research programme, a large Regional Seas project, the Baltic Sea System Study (BASYS) was initiated in 1996 with large participation of Baltic Sea countries. The subproject 7 (SP-7) of BASYS, "The paleoenvironment based on the study of deep basin sediments", aims in its simplest form at the establishment of an environmental deposition record during the past about 8000 years and to give a good guess of what changes might be expected in the near future. Its main objective was to determine physical, chemical and biological parameters that reflect environmental or ecological conditions prevailing at the time of deposition. The present report is part of the work conducted during the three years project period.

Special emphasis is on the Risø tasks which were carried out within SP-7, i.e. Pb-210 dating, screening of sediment cores and analyses of rare earth elements. This report contains both a data bank in the form of mainly tables but in the discussion section looks also into the consequences of the generated data, i.e. the natural and anthropogenic changes suggested by these data. However, because of the large amount of data, only some of them are selected here

2 Setting

The Baltic Sea which comprises some four hundred thousand km^2, is characterised by large fluxes of riverine water inputs and periodic inputs of more salty water at depth from the North Sea. Because the salt water by gravity graduation enters the central Baltic at depth, there is also a natural graduation of water masses in the Baltic. These water fluxes are greatly dependent on climatic variations.

Long and short sediment cores from 3 deep basins were chosen for the paleoenvironmental investigations: the Bornholm Basin (BB), the Gotland Basin (GB) and the North Central Basin (NCB), see Fig. 1.

The Baltic is characterised by a shallow halocline and deep water inflows from the North Sea which however are intermitted and do not follow a well-defined pattern. At the same time, there is a water outflow to the North Sea which mainly comprises low-salinity surface waters. The Bornholm and Gotland Basins are some of the deeper parts of the Baltic Sea with maximum water depths of 90 and 240 m, respectively. There is a significant water salinity stratification in the Bornholm Basin in that the deep water has salinities varying between 14 to 18 PSU while surface waters usually have salinities between 7 and 9 PSU. This compares with the waters of the Gotland Basin which have salinities of 11-13 and 7.5 PSU, respectively. The haloclines for both basins are estimated at 40 to 50 m in the Bornholm and 70-80 in the Gotland Basin. Up to the present, there has been no references to the North Central Basin which is characterised by water depths of about 180 m.

The Baltic Sea is characterised by periodic cyclones coming from the west or southwest. Pressure data are a better expression for the wind climate. Zonal (westerly) winds have recovered to much higher values in recent years and this is coupled with relatively mild winters. Zonal winds were also strong through the first three decades of this century.

Inflow of saline water originating in the North Atlantic water masses proceeds frequently at depth passing the Kattegat, the Danish Sound area and continuing into the central Baltic. Stagnation in major inflows has been observed since 1977 but in 1993 a new major inflow occurred, with the largest salt transport ever registered (17PSU).

3 Methods

3.1 Sampling

The analytical work was mainly based on short Niemistö-type sediment cores taken in all of the three deep basins of the Baltic Sea. Sampling was facilitated during two cruises arranged by the coordinator of BASYS, the Baltic Sea Research Institute, Warnemünde, Germany, in 1996 and 1997, but samples were also taken during national cruises.

Sediment cores were usually sliced directly onboard ship into 1 cm disks, stored in plactic bags in the research vessel's freezer room. By doing this, the core material was usually at the home laboratory within about 10 days after cruise termination. However, during the initial cruise, a number of cores were transported directly to the home laboratory without slicing.

Subsampling from the long box cores was concentrated on the upper 1 m, in that usually the depth interval 50 to 150 cm was sampled by pressing a U-type sampler into the box core material. This sample material was stored in the freezer and also arrived immediately after the cruise termination to the home laboratory. It was then sliced into 1-cm sections.

For assaying of sediment material along the entire box core length, 7 ml cubes that at first were used for paleomagnetic measurement were also available. The sediment material in these cubes was also freeze-dried and used directly for chemical analysis.

3.2 Dating

Lead-210 dating was accomplished by direct gamma-ray spectrometry of ^{210}Pb. The technique has been described elsewhere (e.g., Kunzendorf and Christiansen, 1998). Briefly, freeze-dried slices from Niemistö-type sediment cores were somewhat homogenised before pouring the dry sediment material into sample measurement containers. Sediment sample containers consisted of cylindrical aluminium rings with an inner diameter of 71 mm, i.e. 39.6 cm^2 area. The bottom of the sample container consisted of a thin mylar foil to reduce absorption of the the low-energy gamma radiation of ^{210}Pb (46.5 keV). Depending on sediment material available (most upper part sediment slices from the Baltic have very low dry matter contents) at least 5 g of sample material was used for gamma-ray spectrometry. The tightly closed sample containers were usually stored for about 3 weeks to allow for eventual re-establishment of radioactive equilibrium after possible radon escape from the sample material.

The Pb-210 dating instrumentation consisted of ultra-low background Ge(Li) detectors, i.e with remote construction of detector and detector preamplifier system. Equipped with a carbon epoxy window to reduce radiation absorption before reaching the detector, the system had usually energy resolutions of less than 0.85 keV and less than 1.8 keV at 122 and 1330 keV, respectively. Only the detector head but not its cryostate was placed in the lead shielding. The lead shielding of the systems consisted of 10 cm old (Boliden quality) lead with an overall activity of less than 50 Bq/kg. To suppress the amount of scattered (low-energy) radiation that might reach the detector from the lead shielding, a 5mm thick Cu encapsulation was also applied. The detector signals were fed to a PC-based multichannel analyser system. From the 8k gamma-ray spectrum a number of regions of interests were selected to reduce the amount of data. Usually, a number of naturally occurring radioisotopes from the U and Th decay series as well as anthropogenic radioisotopes, among others ^{137}Cs, were determined. All the dating systems were calibrated against samples with known ^{210}Pb and ^{137}Cs activities.

Using bulk sediment densities calculated as the dry weight of the sediment slice divided by the wet volume of the sediment slice, and using the unsupported ^{210}Pb activities, a modified constant rate of supply (CRS) model was applied to construct a sediment chronology for the past about 150 years of sedimentation. Because the CRS model is thought to be the only one unaffected by various sediment compaction and/or sediment dilution effects in the sediment column, no special sediment mixing layer was introduced for the upper very liquid layer, mainly because such layers are usually difficult to describe as in-situ features. The unsupported ^{210}Pb activity was calculated by subtracting the supported activity which was estimated from the sample's ^{226}Ra or any other decay product activity (often ^{214}Pb is used because of its high specific gamma activity). Because ^{137}Cs was determined at the same measurement, the ^{210}Pb dating results were usually compared and/or adjusted according to the occurrences of known ^{137}Cs markers (Chernobyl, Sellafield, nuclear bomb testing). Figure 2 shows a good example of both unsupported ^{210}Pb and ^{137}Cs activities along a sediment core from the Gotland Basin (core GOB303).

3.3 Chemical analysis

Chemical analysis was carried out using 3 different analytical techniques.

For screening purposes, a modified energy-dispersive X-ray fluorescence (EDX) technique using radioisotopes for characteristic X-ray excitation. The detector system comprised a Si(li) detector system coupled to a sample changer with a capacity of 48 samples. Samples were analysed in the same sample containers which also were used for lead-210 dating, i.e. the bottom of the sample containers comprised a very thin polyethylene film to reduce self absorption of characteristic X-rays produced in the sample. The system has been described previously (Kunzendorf, 1979) but an available conventional least-squares fitting unit, AXIL, was used to evaluate the complex characteristic X-ray spectra. The system was then calibrated against recommended values of 28 international geological reference materials. By using measuring times of 1 hours and two different radioisotope sources, major elements K, Ca, Ti, Mn and Fe and minor and trace elements V, Cr, Ni, Cu, Zn, Ga, As Br, Rb, Sr, Y, Zr, Nb and Mo were determined on a routine basis.

Rare earth elements (REE) and a few trace elements were determined by instrumental neutron analysis (INAA) conducted through the company Tracechem, Copenhagen. The measurement procedure has been described in more detail elsewhere (e.g., Kunzendorf et al. 1984; 1986). Briefly, 200 mg of sediment material was irradiated in the Danish research reactor DR3 and the counting of the irradiated samples was facilitated after several cooling intervals. Gamma spectrometry by Ge(Li) detectors was carried out and after comparison of intensities with those from standard geological reference material, REE contents in the samples were calculated.

At the beginning and the termination of the analytical work, a number of samples was also analysed by ICP-MS because by using this method nearly all of the 15 rare earth elements can be estimated. The check of these analyses however showed that there is minor deviation of the REE patterns at several depths in the cores and because they show a more or less shale-like pattern (nearly horizontal pattern line), INAA was conducted on about 40 samples only, dominantly from the Gotland Basin long core.

For the sake of simplicity however, the REE data are not included in the present report and will be published elsewhere.

4 Results

4.1 Lead-210 dating of short cores

4.1.1 Bornholm Basin

For the Bornholn Basin altogether 7 short cores were dated by the Pb-210/Cs-137 method. While core St18023 is from the pre-BASYS project GOBEX conducted mainly as a pilot project for BASYS and was taken in 1994, cores B1 and B2 were from an RV Aranda cruise early in 1997, cores BBT-B and BBT-C are from the 1997 R/V Kottsov cruise, and BBTA98 and BBTB98 were taken by RV Aranda in 1998.

Unsupported ^{210}Pb and ^{137}Cs activities are plotted in figures 3 and 4, respectively. Clearly, the plots display the sedimentation situation in the Bornholm Basin with rather irregular depth profiles caused by most probably human activities (trawling) in the whole Bornholm Basin area. Two cores (BBT-B and B2) were excluded from GRS modelling because of obvious very large disturbances in the activity profiles.

Only the CRS modelling for core B1 is presented here (Fig. 5). The modelling results in Table 1 show that when using the measured ^{210}Pb depth profile and the dry density data interpolated down to 35 cm, there are relatively low sedimentation rates, between 1 and 2 mm/a until the 1960s. From this time onwards, increasing rates exceeding 4 mm/a are observed. Because of the relatively high dry densities observed (increasing from 0.2 g/cm^3 in the top sediment slice to about 0.6 g/cm^3 at depth) sediment accumulation rates increase from about 1 kg/m^2/a at pre-sixties times to more than 2 kg/m^2/a at present times. Plotting the ^{137}Cs profile on an CRS age scale (Fig. 5) shows an increase of activities since 1945 until the mid eighties with a further increase at the end of the eighties. After 1991, there is a decline of ^{137}Cs activities. This profile would fit the interpretation that nuclear bomb testing dominated until the mid seventies with possible inputs of Sellafield effluents until the mid-eighties and further increase in activities dominated by Chernobyl fallout and later by its outwash from the Scandinavian mainland.

4.1.2 Gotland Basin

For the Gotland Basin only one short core (GBT-C) was taken at the position of the central coring station (box core 211660-6). This was mainly because previous work during the GOBEX (Gotland Basin Experiment) project has recovered a number of cores which also were dated at Risø and these datings are available for the BASYS project.

Comparing the unsupported ^{210}Pb and ^{137}Cs plots of the 3 GOBEX cores (cores 301, 302 and 303) with the GBT-C core (Fig. 6) it appears that they show more or less the same decline with depth. The four cores have differently thick fluffy layers on top, however. Clearly core GBT-C has the thickest fluffy layer (about 5-10 cm) within which unsupported ^{210}Pb activities do not decrease. Through the plots in Fig. 7 (comparison of profiles of GBT-C and GOBEX301) it is seen that the activity curves greatly are the same and that the differences observed are only due to a variably thick fluffily layer on top of the cores, which in turn depends on the coring position within the Gotland Basin.

The CRS modelling results for core GBT-C are shown in Table 2 and Fig. 8. Obviously, sedimentation rates are between 2 and 3 mm/a until the seventies, but 3 to 5 mm/a until the nineties. The very large rates in the upper 5 cm of the core are the result of the very low bulk dry densities and relatively constant unsupported ^{210}Pb activities. Sediment accumulation rates are calculated at about 500-600 g/m^2/a. This compares with e.g. rates observed for the GOBEX core 303 (Christiansen and Kunzendorf, 1998) recovered at lower water depth, being generally at 200-300 g/m^2/a.

4.1.3 North Central Basin

For the North Central Basin, short cores from two cruises were available. Only the results of cores NCBT-A, NCBT-B, NCBT-C and NCBT-D are reported here. The position of all NCB short cores are given in Fig. 9. It can be seen from the figure that NCBT-A and NCBT-B are very close to the final long box core sampling station (core 670-7) while the two other cores were taken towards a local topographical depression.

Total and supported ^{210}Pb activities for the four short cores are given in Fig. 10. Obviously, while cores NCBT-A and NCBT-B have relatively thin fluffy layers of about 5 cm thickness with nearly constant ^{210}Pb activities, the two other cores are characterised by increasing fluffy layer thicknesses with increasing water depth. The fluffy layer thickness is nearly 15 cm in core NCBT-D.

Only the modelling results for core NCBT-B are given here (Fig. 11). Clearly, sedimentation rates were at or slightly below 1 mm/a until the seventies where they started to increase to about 2 mm/a. Very high ^{137}Cs activities (ca. 700 Bq/kg) are observed in the late eighties and middle nineties, declining again in the uppermost sediment slice. These activities can only ascribed the Chernobyl accident where area NCB was closer to the path of the radioactivity plume than the Gotland Basin area. Interestingly, ^{137}Cs activities start to increase in the middle seventies and this may be explained by a different source entering the central Baltic, e.g. Sellafield created effluents, but it may also be contamination from the upper parts of the core during core slicing operations. For comparison, the position of the ^{137}Cs peak in core NCBT-D with the thickest fluffy layer is at 4.5 cm sediment depth (Fig. 10).

4.2 Screening results

A large number of geochemical data exists for the cores from the 3 deep basins. All the data are compiled in appendices A to C and only a few of these results are discussed in the following sections.

4.2.1 Bornholm Basin

4.2.1.1 Core B1 and the upper 1-m section of core 211630-9

For the sake of simplicity, selected analytical data of core B1 and the upper 1-m section of core 211630.9 in the following are plotted together. However it must be borne in mind that the short core probably is disturbed and also that it was not taken at exactly the same site than the long core. Furthermore, there may be a depth discrepancy because the uppers of the long sediment cores are usually not with exact depth assignments.

The distribution of Ca and Mn with depth in the two core sections is shown in Fig. 12. When comparing Ca-Mn distributions it is obvious that one has to consider that exact data comparison can only be done when the data are plotted on mass depth scale because especially in upper parts of the cores is there a significant compaction observed. However, the figure shows, that there is a significant Mn enrichment at a core depth of about 40 cm and since this goes along with Ca enrichment, this probably reflects the occurrence of rhodochrosite in the sediment column (see section on rhodochrosite occurrences). As regards Cu and Zn (Fig. 12, squares are Cu values), there is a significant enrichment of these elements in the upper 20-30 cm of the core sections and this may be explained by pollution starting with increased industrialisation.

A significant variation of trace element contents with depth is shown by the plot of element Br with depth (Fig. 13). Clearly, relatively high Br in the surface (> 400 mg/kg) is followed by decreasing values with depth. Although there is some variation of contents with depth, between 200 and 300 mg/kg, a periodic structure is difficult to evaluate and this is most likely due to the relatively large sampling intervals. Molybdenum contents (Fig. 13) in the sediment slices are low and there is little enrichment of Mo along the core sections.

4.2.1.2 Long core data (cube measurements)

Analytical results for the long sediment core of the Bornholm Basin based on sediment cubes used for paleomagnetic measurements are shown in figures 14 and 15.

As regards Ca and Mn (Fig. 14), a number of high-Mn zones along the core are observed. These high Mn data do not always correlate with high Ca. Because the Ca values in the Bornholm Basin cores are often low and rarely exceeding 0.8% by weight, there are probably very few layers with rhodochrosite and the Mn must be confined to another mineral phase. There is a very clear tendency of upwards decreasing K, Ca and Zr (Fig. 14 and 15) and this is most conveniently explained by a decreasing supply of terrestrial material since the last glaciation.

When comparing the depth distribution of Br (Fig. 15) it seems as if there is some periodicity in the displayed curve. Br may be an indication of saline inflow and therefore the Br distribution may reflects several major and minor North Sea water inflow periods. It is also worthwhile to mention that the Bornholm Basin long core shows low Mo values, although there are sections with slightly increased values.

4.2.2 Gotland Basin

4.2.2.1 Short core and the upper 1-m section of the long box core

The depth distribution of Ca and Mn for cores GBT-C and the section 50 to 150 cm of core 211660-6 are plotted in Fig. 16. Although very high values at 10 cm do somewhat disturb the overall appearance of the distribution, there is a clear tendency throughout the 1.5 m sediment core for Ca to correlate significantly with Mn. This is most easily explained by occurrences of the mineral rhodochrosite. Interestingly, there is a periodicity of the curves in that periods of low Ca and Mn (low rhodochrosite occurrences) of about 15-25 cm length are followed by periods of high Ca-Mn of nearly same duration.

The distribution of base metals Cu and Zn (Fig. 16) shows that there is 4 fold increase of these metals in the upper 10 cm. Such enrichments may be explained by diagenesis or by pollution since the start of the industrialisation in the Baltic Sea area. However, for Cu more points to diagenetic changes also because we observe local enrichments at sediment core depths of. 70, 90 and 130 cm.

The distributions of K and Zr, which as mentioned above, is usually regarded to be an expression of terrestrial input into a sediment basin, show (Fig. 17) that there has been a period of decreased terrestrial input into the Gotland Basin (depth interval 60-110 cm) corresponding to a decrease of K and Zr of about 1.5% and 60 mg/kg, respectively.

Relatively high Br values reaching more than 400 mg/kg (Fig. 18) in the upper 10 cm of core GBT-C are best explained by saline water accumulation on top of the core. At depth, Br contents are more or less constant, typically at 100 mg/kg, although there is some elevated Br at the depth interval 60 to 80 cm. Comparing this with the distribution of Mo (Fig. 18), it is obvious that the two elements correlate somewhat and that there are zones of Mo enrichments, especially in the upper 10 cm and the interval 60 to 110 cm.

4.2.2.2 Long box core data (cube measurements)

While the 1-m section discussed above was taken from the box core 211660-6, the analytical data on cubes used for paleomagnetic measurements were gathered from piston core 211660-1. Although the general picture is not expected to vary very much for the two cores, the piston core has been found to lack the upper about 40 cm.

The distribution of Ca-Mn (Fig. 19) shows that there are high Ca and Mn throughout the marine section of the core (down to about 380 cm) and Mn diminishes at greater depths. In the upper 380 cm of the core there are many peaks of Ca and Mn (see Fig. 19, middle part) suggesting that there is rhodochrosite mineralisation throughout this section. Because the sampling is on a more coarse scale (each about 3 cm), there might be other occurrences of rhodochrosite within the sediment sections.

For the trace metals Cu (Fig. 19) there is a tendency of accumulations section wise: from the bottom to about 6 m, from 6 m to about 5.5 m, from 5 m to 4.5 m, from 4 to 3.5 m, from 3 to 2.1 m, and from 1.5 m to the top. This is probably caused by post-depositional diagenesis within the sediment. For Zn, the situation is different, with a relatively high Zn (> 120 mg/kg) section from the bottom to about 5 m depth, and a section with lower Zn (about 105 mg/kg) from 4m to 0.8 m, and only in the upper 80 cm is there a correlation with Zn.

For K (Fig. 20) there is a clear tendency in that there is a stable content below 6 m, while there is a steadily upwards decreasing K content in the core. The trace element Rb follows this trend closely. The situation is somewhat different for Zr where a clear nearly linear decrease is observed throughout the whole core section. Zr being closely connected with residual minerals is therefore thought to be connected with the continuous onset of deglaciation, the erosional load to the Baltic being gradually decreased during this process.

Although the uppermost part (about 40 cm) of core 211660-1 with likely additional enrichments is missing, the Mo distribution shows remarkable maxima at several core depths down to 380 cm (Fig. 21) and Br follows this tendency somewhat. There are periods with relatively low Mo, between 80 and 180 cm. The most significant observation is that the magnitude of Mo values at maximal intervals is near at 200 mg/kg. For Br (Fig. 21), there is a clear trend in that contents decrease greatly with depth, and sometimes, elevated Br correlates with Mo maxima.

4.2.3.North Central Basin

4.3.2.1 Short cores and the upper 1-m section of a long box core

There is very little variation of Ca and Mn in core NCBT-B and the upper 1-m section of the long box core 211670-7 (Fig. 22). A few Mn peaks are observed but there is usually no similar Ca enrichment so that for this sediment section, there is probably little rhodochrosite mineralisation. The reason for this are the relatively low Mn contents, usually not exceeding 2000 mg/kg.

There is very little variation of K and Zr (Figs. 22 and 23, respectively) along the cores and only in the fluffy top layer is there a significant decrease in these two elements. There is therefore little indication that the terrestrial load in the North Central Basin has changed significantly during recent and subrecent times and this basin is probably not an important depositional center of the Baltic Sea.

For Cu and Zn (Fig. 22), the same tendency than in the Gotland Basin is observed: Cu shows some local enrichments while Zn (and Cu) is only enriched in the top 5 cm.

Comparing the distributions of Mo and Br (Fig. 23), there are accumulations of these trace elements in the top 5 cm and at about 95 to 115 cm.

4.2.3.2 Long box core data (cube measurements)

The geochemical profiles for the North Central Basin are not based on the long box core 211670-7 but on selected cubes for paleomagnetic measurements from a piston core (GC4), recovered from the same area (very close to site 211670-7) during an earlier cruise in 1996.

Comparing the distributions with depth of Ca and Mn (Fig. 24) it appears that there is a zone of Ca and Mn enrichments in the lowermost part of the core, between 450 and 500 cm. Otherwise Mn contents are relatively low (< 2000 mg/kg). This would suggest that we had rhodochrosite formation in earlier time in the North Central Basin. Although less pronounced, there is a slight upwards decrease of Ca throughout core GC4. The distributions for Cu and Zn however (Fig. 24) show very little variation.

While there is slight upwards decrease for K and Zr (Fig. 25), there are 3 zones of enrichment observed for Mo and Br (Fig. 26): between 5 and 4.5 m, 4.5 and 4 m, and between 1.2 to 1 m.

5 Discussions of the geochemical data

The geochemical work on sediment cores from three deep basins of the Baltic Sea has generated a wealth of analytical data which is difficult to treat as one homogeneous data set. Instead of discussing the large amount of data we have chosen to focus on 3 topics: rhodochrosite occurrences, molybdenum accumulations and sediment layering. However, as there is a need to place the findings into previously reported knowledge, we give a short overview of important recent literature.

5.1 General remarks and previous work

When discussing major and trace elements in marine sediments one has to consider sources of sedimentation and then, terrestrial erosional transport to the oceans and biogenic productivity in surface waters have to be included. Lately, it has been found that also airborne particle transport to the sea is important to consider (Nriagu, 1989). While airborne soil particles, volcanoe emissions, sea-air interface emissions and forest fires were regarded important atmospheric trace metal sources, it has been documented that about 30-50% of biogenic aerosols, i.e. particulate organic matter, contribute to the atmospheric load of trace metals. In the following, a few recent investigations are discussed briefly.

According to a recent review by Butler (1998), transition trace metals play an important role in marine productivity. However, although it is considered that especially iron is necessary for the growth of bacteria, it is now also recognised that transition metals Zn, Co and Cd are important in that they may reduce the uptake and fixation of inorganic carbon. In general, however, according to this author, there is limited knowledge on marine bioinorganic chemistry.

Falkowski et al. (1998) consider that phytoplankton and especially cyanobacteria have been overlooked when discussing biogeochemical processes. By looking at the carbon flux driven by a phytoplankton mass it is concluded, that the phytoplankton biomass turns over as frequently as once per week and it is therefore essential to have sufficient nutrient supply. Storms and mesoscale eddies are regarded as nutrient deliverer. These authors consider that only few species of cyanobacteria accomplish the nitrogen fixation in the open ocean and N fixation is limited by Fe which is often supplied to the oceans with terrestrial dust.

Biogeochemical cycles in the oceans are more and more influenced by the large amount of chemicals supplied via industrial outlets (Jickels, 1998). According to this author among others, the Baltic is already facing problems like restricted horizontal water exchange and also stagnation of bottom water. Especially riverine inputs of N and P have increased by a factor 2-3 and nitrate concentrations in ground water are increasing significantly. The situation is not better if one knows that atmospheric inputs of N and P are now considered a significant source. An increase in nutrient load to the ocean is expected to increase the phytoplankton activity and especially a change in numbers and relative phytoplankton species is expected. Nuisance algal blooms are now relatively often occurring in the North Sea, the Baltic Sea and the Adriatic Sea.

As regards riverine inorganic nitrogen loads, Pelley (1998) proposes that these loads could be more than doubled by 2050, but especially the atmospheric load of nitrogen is most significantly growing further. The algal response to these increasing loads is increased primary productivity and algal blooms - some of them harmful - are increasingly observed. The processes to be considered are simple: nutrients increase phytoplankton production leading to blooms that are consumed by zooplankton. Fecal pellets excreted settle at the seafloor, which in turn are the food for bacteria that consume oxygen when digesting algal remains. Pelly (1998) also mentioned that an increased ammonia input usually is advantageous for cyanobacteria occurrences and the source for ammonia are fertilizers and hypoxic sediments.

When it comes to the behaviour of Mn and other metals in the oceans and in marine sediments Calvert and Perdersen (1993) predict that porewater dissolved Mn concentrations have to be at least 5 orders of magnitude higher than oxic bottom water contents to form a Mn carbonate. According to these authors this is usually the case in marine anoxic basins. These authors conclude that high Mn carbonate in sediments indicates that the sediments originally accumulated under oxic bottom water conditions. However, this is far too simple an explanation because diagenetically supplied dissolved Mn may rest in a pool at the seawater-sediment interface or below the halocline and be involved in the intermittedly transformation into the carbonate phase when oxic bottom water reaches these pools. The carbonate then settles on the seafloor and creates layers of rhodochrosite. Upon burial, these layers remain in the sediment column. This is at least the case in the Gotland Deep. According to Calvert and Pedersen (1993) however, occurrences of mixed Mn carbonates in anoxic sediments suggests that Mn can be used as an indicator of sedimentation under oxic bottom water conditions.

Bromine is an element which usually behaves conservatively (Calvert and Pedersen, 1993). During burial, bromide contents change very little. There is usually very few data on this element in Baltic marine sediments. Ni and Zn are regarded micronutrients in the marine realm which means that they are removed from the surface waters during primary production. In contrast to this, Cu is both regarded a micronutrient but may also be removed at depth in the seawater.

According to Calvert and Pedersen (1993), Mo shows great potential as a proxy indicator under anoxic conditions. There is a coupling between Mn and Mo due to diagenetic cycling in modern sediments. However, there is no evidence that diagenetically released Mo is adsorbed onto organic matter according to these authors, but on the other hand, there is very little mention of that Mo may be connected with algal fixation of nitrogen.

5.2 Rhodochrosite formation as viewed by the geochemical data

5.2.1 Previous work

Of the few publications investigating the rhodochrosite formation in Baltic Sea sediments, a few are discussed in the following.

Suess (1979) described among others the Mn-Ca carbonates in sediments from the Landsort Deep of the north-central Baltic. While there is a tendency of undersaturation of carbonate in the oxic water column, generation of CO_2 in anoxic sediments leads to supersaturation due mainly to the formation of hydrogen sulfide and other weak acids. Suess argued that anoxic sediments are responsible for the formation of authigenic Mn-Ca carbonates. He also reported that occurrences of these mixed carbonates in the Landsort Deep are strongly depleted in ^{13}C suggesting a biogenic origin. Furthermore, the carbonates occur dominatly as spherical microconcretions. However, such occurrences, layers of microconcretions, point also to that they probably are the product of mineral settling on the seafloor in appropriate time intervals. According to Suess (1979), high concentrations of dissolved Mn^{2+} occur both in pore and bottom waters of the deep basins of the Baltic, so there even is the possibility of producing MnS (alabandite, wurtzite) as a low-temperature species to be created and then occurring in dense lenses in the layered sediments. Finally, because the amount of authigenic phases found in the Landsort Deep sediments prevents the formation in a quasi-closed system but rather suggests that these phases were formed by continuous supply of dissolved solutes.

Suspended matter investigations of the Baltic Sea (Bernard and van Grieken, 1989) suggested that the North Sea is a source of calcium carbonate found in the Baltic Sea. These findings were also documented by sediment trap investigations in Danish waters (Christiansen et al., 1995).

Huckriede et al. (1995) reported that due to only a small increase in the salinity of bottom waters in the Gotland Basin, the halocline is raised significantly and because the deep water below the halocline is a major source of nutrients, primary production in the photic zone may be increased significantly. This in turn may lead to enhanced oxygen consumption because of the break-down of organic matter. These authors postulate that high-salinity periods lead to anoxic bottom water conditions lasting 300 to 400 years while periods of low saltwater inflow generating frequently oxic bottom water conditions last between 400 and 600 years.

In another publication, Huckriede and Meischner (1996) treat the manganese-rich sediments of the Baltic Sea as an analog of know Jurassic manganese ores as did Jenkyns (1988). According to the authors there is a an especially high dissolved Mn content in the anoxic bottom water of the central Baltic Sea because of both salinity stratification and a high productivity in surface waters. The process of rhodochrosite layer formation is described as a two-step process: saltwater inflow produces Mn oxides which settle at the surface which then due to anoxia dissolves the oxic particles and formation of Mn carbonates is initiated because of a to high alkalinity steming from bacterial reduction processes.

Recently, Lepland and Stevens (1998) focused on the manganese phases observed in another deep basin of the Baltic, the Landsort Deep. They report especially on occurrences of alabandite (MnS) which usually is not observed in sedimentary settings. They also speculated on the formation of Mn carbonates and agreed with other investigators (Huckriede et al., 1995; Sternbeck and Sohlenius, 1997) that Mn carbonate laminae are formed at the sediment-seawater interface. Because Mn carbonate formation in anoxic environments requires unusually high alkalinity in the bottom water, the authors suggest that this can be achieved by seasonal alkalinity variations fed by periodic organic matter supply. High alkalinity is then thought to occur mainly in the deepest parts of the basins. These prerequisites lead the authors to suggest that the Mn carbonate laminae are nearly annually. A major speculation is the origin of the very high Mn in the Deep and they conclude that additional to organic matter decay, there must exist another important Mn source which they believe is coupled with the dynamics of the anoxic waters (rising and declining of anoxic bottom water).

5.2.2 The BASYS data

As regards the presented data, it is obvious that because of relatively low Mn (less than about 2000 mg/kg) and Ca (less than 0.8 %) contents, in the Bornholm Basin sediments (see Figs. 12 and 14), there is little indication for rhodochrosite occurrences there. However, viewing the total length of core 211630-9 (Fig. 14) it is obvious that there are sections with sufficient high Mn and Ca, especially at depths 30, 180, 220, 280, 320 and 360 cm, which therefore must be regarded as rhodochrosite bearing.

Although the water depths are usually a factor of 2 to 3 lower than in the two other basins the question arises why there are fewer rhodochrosite-bearing sections in the Bornholm Basin. The only trustworthy explanation is that Mn (and Ca) are not sufficiently supplied through terrestrial and biogenic pathways. This may be altered somewhat by the fact that due to the lower water depths involved, Mn is mainly deposited in fine particles that finally settle in the deepest parts of the Baltic which is not the Bornholm Basin. Also, contrary to the Gotland and North Central basins, surface sediments are mostly oxic in the Bornholm Basin leading to a preferably oxic precipitation.

The data for the upper 1.5 m of the Gotland Basisn (Fig. 16) suggest that there is a close connection of Ca-Mn throughout the entire core length, i.e. rhodochrosite formation occurs along the entire section. Furthermore, the systematic 1-cm sample data suggest that there is some cyclicity in the data in that subsections with relatively high Ca-Mn (rhodochrosite) exist followed by subsections where there are lower Mn-Ca. The low Ca-Mn sections are characterised by Ca contents of about 1% which is increased to about 3 % in the high Ca-Mn sections. The cyclicity is about 20-30 cm. Only the uppermost 50 cm have a 30 cm low Ca-Mn section which may be explained by the fact that mainly rather loosely deposited sediments (suspensions) occur.

Viewing the Ca-Mn distribution along piston core 211660-1 (Fig. 19) it is obvious that rhodochrosite formation is observed only in the marine section of the core, from about 3.8 m core depth onwards. Because the data for core 211660-1 are not systematic but in predefined steps, it is difficult to observe a cyclicity in the data although there are a number of maxima and minima in the Ca-Mn distribution of this core.

The Ca-Mn data for sediment cores from the North Central Basin (Figs. 22 and 23) are quite different to those from the Gotland Basin. As was the case for the Bornholm Basin these cores have generally lower Mn and Ca, at less than 2000 mg/kg and less than 0.8%, respectively. Such contents are not sufficient to form rhodochrosite although there is a similar hydrographic framework at the North Central and in the Gotland Basin. Only in the subsection 4.5 5 m of core 211370-7 is there a tendency that may suggest rhodochrosite occurrences.

In general, the BASYS data confirm the processes of rhodochrosite formation reported for the Bornholm Basin and the Gotland Basin by Huckriede et al. 1995). There is no doubt that rhodochrosite formation is closely coupled to salinity changes in the Gotland Basin and most probably coupled to salt water inflow from the North Sea. According to these authors, C and S show a distinct cyclic periodicity in the sediments of the Gotland Basin in that 20 to 30 cm thick zone with increased organic and inorganic C occur. Because of increased $\delta^{18}O$ and Na/Mn ratios this increase in C is thought to be coupled to salinity increases. The authors suggest also that periods of increased salinity may lead to anoxic bottom water conditions and such periods are thought to last 400 to 600 years.

The periodicicity outlined by our data for the Gotland Basin is about 300 years. Similar periodicities but at lower rates (200 years) were reported by Leventer et al. (1996) for the Antarctic Peninsula region. In any case, such fluctuations are generally thought to be coupled with changes in the solar activity. For instance, solar constant changes by several per cent during a cycle of 11 years duration were already reported by Suess, (1968). Suess used the natural radiocarbon to be coupled with climate. Accordingly, at times of rising $\delta^{14}C$, i.e. when the sun is relatively quiet and has a low number of sunspots, continental areas of Europe showed a record number of cold winters. This was the case during the 13th, 15th and 17th centuries. As for ^{14}C, low solar activity leads to a steady rise in $\delta^{14}C$ and, at the same time to a slow decrease in the average temperature of the British Isles. Suess argued also that periods with high solar activity are associated with warm climate and periods of a quiet sun with low temperatures. From this follows that the present climate is extremely sensitive to changes in the incoming radiation of the sun. However the observed periodicitity and a probable coupling with solar activity is perhaps not directly applicable and the cyclicity observed in the sediments of the central Baltic Sea (Gotland Basin) is probably tighter coupled to some other phenomenon.

Schumacher (1990) studying the Wismar Bay beach ridge deposits described also the fluctuations of storm tides observed on the southern Baltic coast. He proposed cycles of about 250-300 years duration where the wind direction changes. A cycle with predominating NW winds is followed by one with predominating NE wind directions. Accordingly, the storm flood events from the 15. to the 16. and from the 18. to the 19. century are mainly caused by northwesterly storms (low amplitudes and of local nature), while those in the 14., 17. and 20. Century were most likely from northeasterly directions.

Lately, Kaszubowski (1995) has described transgressive cycles observed in the Baltic Sea based on investigations along the Polish coastline which he compared with the 300-years cycles reported by Williams (1986) which reported them in Precambrian sedimentary rocks from southeastern Australia. Accordingly, there are 5 transgressive cycles observed in the Baltic since about 630 years BC, each of them having a duration of about 314 years. Explicitely, the first transgressive cycle started 632 BC and ended about year 318 BC and the last is thought to have started in about 1880. Kaszubowski (1995) also reports that the mean sealevel changes were generally of the order of some 0.5 m.

Although there still is some question about the chronological model for the cores from the Gotland Basin (a combination of ^{14}C-AMS, paleomagnetic measurements and ^{210}Pb dating) we can assign the systematic sampled 1.5 m section of the Gotland Basin a chronology (Fig. 27). If the data presented by Kaszubowski are correct and based on sound data (not confirmed yet), the high sealevel stand in the year about 900 AD would correspond to the Ca-Mn maximum observed at 1.1 m in core 211660-6 (Fig. 28). The following low Ca-Mn section between 0.9 and 1.05 m would then correspond to the regressive part of the cycle starting in about 700 AD (Fig. 28, lower part).

In general, maximal transgressive periods would lead to elevated Ca-Mn in sediments, i.e. to increased rhodochrosite deposition. Low sea level stands, at the end of a transgressive phase would then lead to decreased saltwater inflow into the central Baltic and thus a lower rhodochrosite signal would be formed in the sediments. This scenario is, however only valid for the Gotland Basin because only here do we have sufficient dissolved Mn available and/or increased alkalinities to produce authigenic rhodochrosite.

5.3 The problem of Mo accumulations

5.3.1 Previous work

As regards the relatively high Mo, especially found in Gotland Basin sediments there is a need of data on the behaviour of Mo in the marine environment. According to Crusius et al. (1996), Mo (and Re) can be used as geochemical indicators of past oxic-anoxic conditions not only in the water column but also in the sediments deposited because their behaviour in the marine environment is thought to be relatively well-known. Because the dissolved Mo species Mo_4^{2-} is relatively unreactive in oxic seawater, there is little variation in Mo from ocean to ocean. Calvert and Pedersen (1993) reported that research had shown significant decrease of Mo in the anoxic waters. They mention that Mo in the sediments is closely related to the cycling of Mn in the sediment column. In oxic sediments when Mn oxyhydroxides are dissolved during burial also Mo is dissolved. The processes of release of Mo are described in detail by these authors, where Mo is mainly coupled to the Fe dissolution processes. However, a few other investigations have also stressed that Mo may be involved with organic matter in some marginal marine sediments, but Calvert and Pedersen (1993) relate usually organic carbon accumulations in sediments to be depleted in Mo.

In any case, however, very few investigations in the literature have coupled the Mo in sediments with the biogenic phase steming from the surface water productivity. Because the central Baltic Sea is constantly opposed to algal blooming in recent years, it is worthwhile to consider blue-green and green algae as metal sources for the sediments.

When it comes to these algae one has to consider the oldest photosynthesizers on earth, cyanobacteria, formerly also called blue-green algae. Not all cyanobacteria are blue-green, they may be bright green, and they may even be lethal. Cyanobacteria may cultivate some bacteria and weed out others by leaking certain compounds, including some that happen to be toxic animals. These toxin producers seem to be responding to increases in the amount of N, P and other nutrients washing off the land from fertilizers and animal wastes.

According to Paerl (1985), microzones which are internal microenvironments, are formed by cyanobacterial-bacterial aggregates. Such microzones are preferably formed at low turbulence in the surface waters and adequate supplies of dissolved organic matter, while such zones are significantly reduced at increased turbulence and then decrease dissolved organic matter (DOM) availability.

Toxic cyanobacterial blooms are frequently reported in the freshwater realm (e.g. Feitz et al., 1999; Rivasseau et al., 1999). There is more and more concern with these blooms because the cyanobacteria produce toxins among which are heptapetides and microcystins dangerous for animal and human health.

A few studies that concentrate on molybdenum in connection with cyanobacteria growth are given here. Attridge and Rowell (1997) in studying cyanobacteria species of *Anabaena* found that their growth was dependent on Mo and V availability. Schrautemeier et al (1995) reported that in filamentous cyanobacteria two nitrogen fixing systems occur that are based on Mo nitrogenases. Cole et al. (1993) in investigating the uptake of molybdenate in cyanobacteria taxa and natural phytoplankton communities of freshwater lakes found that both tungstate and sulfate were able to inhibit molybdenate uptake. As regards marine and estuarine systems the authors suggest that sulfate may reduce molybdenate uptake by up to 20%. However, while neither sulfate nor Mo concentrations alone in salt water are indicative of abundances of planktonic, N-fixing cyanobacteria, the ratio SO_4^{2-}/Mo is regarded a strong indicator (Marino etal., 1990). It has been known that this ratio is rather high in seawater compared to freshwater. In any case, these authors found little evidence for that the N/P ratio is not a good predictor for cyanobacteria occurrences.

Recently, Lin and Stewart (1998) have given a review on nitrate assimilation of bacteria. Accordingly nitrate uptake occurs through a periplasmic binding protein-dependent system. Both molybdenum and iron are involved. However, there are still a number of unsolved problems concerning the mechanism and energetics of nitrate uptake.

5.3.2 The BASYS data

Comparing the Mo distribution with depth in cores from the 3 deep basins, it is obvious that there is little Mo in the cores from the Bornholm Basin (Fig. 13 and Fig. 15). However, there is some enrichment at 50 cm core depth in core 211630-9 and also a fair indication for enrichments at depths 2, 2.8 and 4.1 m (Fig. 15). The problem with the Bornholm Basin is that the Mo signal steming from the surface waters has probably been diluted too much with terrigenic material (relatively high sedimentation rates) so that Mo contents in bulk sediments are close to the detection limit of the analytical method (about 10-20 mg/kg). It should however be mentioned that the Mo data for short cores from the Bornholm Basin by ICP-MS presented by Vallius (1999, oral communication) show a clear surface Mo enrichment.

There is a much stronger Mo signal in the cores from the Gotland Basin. Surface core GBT-C (Fig. 18) shows significant Mo (over 150 mg/kg) in the section 0-15 cm depth which coincides with the entire flocculated surface layer. Then a low-Mo section follows which is about 35 cm long. At depth, 55 cm in core 211660-6, Mo increases again, but this time over a depth interval of about 60 cm. Top concentrations exceed 200 mg /kg. The Mo distribution shown in Fig. 18 closely matches the distribution of total organic carbon (Fig. 29) which was based on data supplied to the BASYS SP7 data base (M. Voss, IO Warnemünde, Germany, pers. communication). There is therefore little doubt that Mo is connected with organic C in the sediments, i.e. with the biogenic phase.

Interestingly, Mo accumulations are also observed in piston core 211660-1 at greater depth. Comparing the Mo distribution in Fig. 21 it is obvious that the high Mo zone between about 20 and 90 cm corresponds to the high Mo zone between 55 and 115 cm observed in core 211660-6 (Fig. 18) This means that the piston core most likely lacks the upper about 30 to 40 cm. Using this, the two further high-Mo zones in the piston core have to be placed at about 230 to 230 and about 330 and 400 cm.

Correspondingly, but at lower concentrations also the cores from the North Central Basin show zones of elevated Mo along the cores (Fig. 23 and Fig. 26).

Assuming then that Mo is connected with the biogenic fraction (organic carbon) there is only one possibility to speculate on the origin of Mo accumulations. Because we know of frequently occurring algal blooms in the central Baltic Sea and because cyanobacteria need among others the micronutrient Mo for the fixation of nitrogen, Mo is thought to be transported to the sea floor by mainly decaying algal remains or fine Mn particles and to a lesser extent by grazing biota. Mo is then probably released by the reworking of organic matter by bacteria and incorporated into the sediments in the form of probably MoS_2. If this is the process of Mo accumulation on the seafloor dominating the central Baltic, then there is little to add to the investigations on the occurrence of Mo in anoxic sediments by among others Halberg (1974) who introduced anoxicity ratios based on mainly Mo which is by no means the driving force for this element.

In a recent publication (Struck et al:, 1998), discuss the sources for nitrogen in the central Baltic during the past century by investigating fossil zooplankton exoskeletons from dated sediment cores. They found an increase in abundances of exoskeletons of *Bosmina longispina maritima* since about 1965. There has been an increase in the nutrient load to the Baltic since about 1950 caused by more extensive agricultural activities and waste discharges. It is generally agreed that, of the total load of nitrogen to the Baltic Sea, about one third is by airborne input while about 30% of the airborne supply is removed by nitrogen fixing cyanobacteria. Reportedly, there is an increase in occurrences of cyanobacterial mats in the 1970s. Struck et al. (1998) also mention that cyanobacteria occurrences which flag eutrophication, are a major part of food to zooplankton. The authors also outline that nitrogen fixation by diazotrophic bacteria has been a relatively large source of nitrogen in the Baltic. We can add to this that the cyanobacteria increase observed in the Baltic most probably is followed by Mo accumulations in the sediments.

Plankton diversity changed since 1976-77 in the Baltic Proper and the Gulf of Finland but was also observed in the North Sea and in Californian waters (Vuorinen and Hänninen, 1999). All zooplankton species react in the Baltic to salinity changes. River run-off to the Baltic Proper has increased since 1960 from about 95 $x10^3$ km^3 to about $120x10^3$ km^3 in 1995. At the same time, a salinity change from about 12.8 to about 11.2 PSU was observed for the Gotland Deep water below 200 m depth. The run-off was shown to correlate with the NAO index, with increased rainfalls in years with high NAO index.

As regards the Gotland Basin, the upper water layer with the lowest but nearly stable salinities (7-7.7 PSU) which is opposed to climatic forcing and drastic seasonal temperature changes (from less than 10^o C to 17^oC) has a thickness of about 30 m (Kostrichkina et al., 1999). A cold, up to 45 m thick intermediate layer with a salinity of less than 8.5 PSU is also observed. The most characteristic feature is the deep layer below the halocline which is penetrated by saline inflow water once in a while. This deep water is characterised by a temperture of 4-6^oC and salinities varying between 10 and 13 PSU. During periods of stagnation, anoxia are observed. According to these authors, diatoms, blue-green and green algae were the major components of the total biomass with a tendency of decreasing diatom fraction on account of increasing blue-green algae occurrences. In summer and autumn, blue-green algae are the major fraction of the phytoplankton biomass. They conclude from their investigations spanning from 1976 to 1992 that a change in phytoplankton community structure occurred in the mid eighties (decline of diatoms and increase of dinoflagellates and blue-green algae). Along with this a decline in spring and summer nutrient concentrations at raising water temperatures was observed.

5.4 The problem of layered versus homogeneous sediments

When studying the Baltic Sea sediments which intriguely are composed of sections with finely laminated sediments and thick zones of more homogeneous sediments, one has to ask why we have this behaviour and what causes the zonation.

Laminated sediments have long time ago been regarded as annual depositional features (varves, varved sediments). For instance, Williams (1986), studying Australian densely laminated Precambrian rock sequences has tried to evaluate the solar cycle during these times. Although the low sunspot activity in the late 17th and the early 18th centuries, called the Maunder Minimum, was linked to the coldest part of the Little Ice Age (LIA; time span of cold weather in Europe from the 16th to the early 19th centuries) he was not so sure about this coupling. Describing the laminations as varves, i.e. annual deposits, the varve thicknesses may be interpretated as climatological proxies in that the thinnest laminations probably reflect the coldest periods. He found cycles from 8 to 16 varves. Williams (1986) describes especially an Elatina cycle consisting of about 26 prominent 12 year cycles, i.e. a cycles of 275 to 335 years duration probably connected to climatic changes caused by the solar activity.

We know from oceanographic and hydrographic studies conducted in the Baltic Sea that there are variation in space and time. Wintertime atmospheric circulation changes have occurred during recent times in both the North Pacific and North Atlantic (North Atlantic Circulation, NAO). NAO has been extreme since 1980 yielding among others to surface warming over Europe and cooling in the northwest Atlantic (Hurrell and van Loon, 1997) and at the same time, a northward shift of storm tracks has been observed. Lehmann et al.(1999) investigated the mean circulation pattern in the Baltic based on long-term current investigations. A three-dimensional circulation pattern of the Baltic Sea system has actually not been known previously. Using a coupled sea ice-ocean model and a realistic meteorological data base together with river run-off data a circulation model was constructed by the authors. The model gives a rather stable cyclonic recirculation in the eastern Gotland Basin and a branching at the northern part of the basin where there occurs also a circulation to the south. Most of this water circulation occurs above the halocline. As regards the bottom currents, they are directed eastwards through the Bornholm Gat and the Stolpe Trench and are most likely a persisting phenomenon. Predominating southwesterly winds determine up- and downwelling areas in the Baltic. Kornilovs (1999) reports on the oceanographic investigations in the central Baltic since 1960, mainly seasonal data of water temperature, salinity and oxygen content tegether with metoeological observations.

Recently, Leventer et al. (1996) discussed productivity cycles in the Antarctic which were found of duration of 200 to 300 years using laminated sediments. Although there are some discrepancies regarding their carbon-14 ages, the cyclic productivity signal was explained by probably being connected with the solar cycle but on the other side is thought to be highly speculative. Regarding the question of occurrences of laminated and thickly bedded sediments, the authors propose that laminated sediments are generated in times of weak wind forcing and elevated surface water temperatures leading to a high productivity and nutrient depletion, flocculation of biogenic remains and rapid settling of these aggregates. Through reduced grazing and dissolution, fine laminae are formed at the seafloor surface. Contrary, during normal conditions when stronger winds or storms are prevailing, a well-ventilated water surface down to about 100 m leads to lower productivity and smaller cell densities at adequate nutrient supply and slow settling of biogenic remains that are opposed to much grazing. Thickly bedded (homogeneous) sediment sections are then produced.

Taking this knowledge into consideration a rather different and actually provocative model of the formation of laminated and homogeneous sediments in the Baltic can be established. Low wind forcing and sufficient supply of nutrients leads to algal blooming in the central Baltic. Cyanobacterial blooms require furthermore a distinct and relatively constant salinity coupled to probably Mo availability, because such blooms are usually not observed in the more saline North Sea. Blooming periods generate finely laminated sediments in that biogenic remains combine on their way down to the seafloor into flocs that settle relatively quickly as a thin layer, which however by no means is an annual feature, but merely dependent on the prevailing nutrient/hydrographic regime.

In periods characterised by increased wind forcing which are regarded as normal conditions, the particle transport to the seafloor is restricted due to decreased primary productivity and more homogeneous sediments are deposited. It should be mentioned that the wind forcing could have something to do with a prevailing wind direction. If this is the process – a kind of a biogenic pump-, there is very little hope that the laminae can be used for chronological purposes, i.e by counting of annual layers (varves) to construct a sedimentation history as is usually done with lake sediments.

6. Conclusions

Through the BASYS project a number of short and long sediment cores from 3 deep basins were investigated for dating and geochemistry purposes. While there is the expected result from lead-210 dating that it was found difficult to date the Bornholm Basin sediments (human impact), the sedimentation in the two other basins (Gotland Basin and North Central Basin) is usually low at 1-3 mm/a. The systematic geochemical data revealed new information as regards the environment of deposition during the past ca. 8000 years.

1. As regards the supply of terrestrial material (run-off from land) there is a distinct decrease of the terrestrial load as outlined by a significant decrease of typically terrigeneous elements K, Rb and Zr towards present times in the long cores from the Bornholm Basin and the Gotland Basin. Because the North Central Basin is probably only a local depression and not a major depositional center, there is no decrease of these elements there. That this drop is significant is best outlined by the Zr distribution where contents are about 160 mg/kg at 5 m depth in core 211660-1 (Gotland Basin) and decreases nearly linearly to about 60 mg/kg in present times. A good explanation for this observation would be continental uplift after the last glaciation with decreasing shoreline erosion.
2. Ca-Mn data clearly outline that there is a significant formation of rhodochrosite in the Gotland Basin most likely coupled to bottom saltwater inflow from the North Sea. It supplies the hydrogen carbonate to combine with dissolved manganese at appropriate alkalinity to Mn-Ca carbonate. Rhodochrosite is observed through the entire marine section of core 211660-6, i.e. some 4.5 m. Furthermore, the systematic data especially from the upper 1.5 m of the core suggest that there is a cyclicity in rhodochrosite formation in that periods with high rhodochrosite are followed by periods with low rhodchrosite formation, the cyclitity being about 300 years. An explanation for this behaviour could be sea level variations leading to increase or decrease of saltwater supply from the North Sea.
3. As regards the relatively high values of Mo in the sediments, a new pathway for accumulation is proposed that takes into consideration the nitrogen fixation in the surface waters. Molybdenum is thought to be extracted by cyanobacteria from seawater in the process of nitrogen fixation. Remnants from the algal blooming periods and their grazers settle on the seafloor and can be traced in the sediment column. There is therefore a perfect correlation between Mo and organic carbon. This model is different to the one valid for Mo used up to now, where Mo was ascribed to be an anoxicity indicator in the sediment.
4. Combining the geological (laminated and homogeneous sediment sections) with geochemical evidence (Ca-Mn, Mo and organic carbon) the sedimentation in the Baltic deep basins is thought to be a coupling of biogenic remains transport superimposed on the terrigeneous load. Biogenic transport

is usually high in times of decreased wind forcing and sufficient nutrient supply leading to the formation of thin sediment laminae while during normal periods, at increased wind forcing less biogenic material reaches the seafloor and more homogeneous sediments are produced.

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Tables

Table 1 CRS modelling results of core B1 from the Bornholm Basin.

		Gamma	Dating	Center		
		Core:	B1-BAS		SYSTEM3	
		Date:	971104			
		Data used:	all o.k		Core take:	1997
Slice measured	Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate (g/m2/a)
*	0	1	0.5	1996.7	1.50	2950.5
*	1	2	1.5	1995.9	1.17	3437.0
*	2	3	2.5	1994.9	0.85	2737.7
*	3	4	3.5	1993.5	0.65	2094.3
*	4	5	4.5	1991.9	0.59	1978.7
*	5	6	5.5	1990.2	0.58	2128.2
*	6	7	6.5	1988.4	0.52	2142.9
*	7	8	7.5	1986.3	0.47	2045.3
*	8	9	8.5	1984.3	0.52	2199.7
*	9	10	9.5	1981.8	0.33	1548.0
	10	11	10.5	1979.1	0.40	1675.9
	11	12	11.5	1976.6	0.40	1855.3
*	12	13	12.5	1973.7	0.31	1494.0
	13	14	13.5	1970.3	0.28	1378.6
	14	15	14.5	1966.7	0.27	1259.8
*	15	16	15.5	1962.5	0.22	1126.6
	16	17	16.5	1957.8	0.20	1055.4
	17	18	17.5	1952.7	0.19	979.4
	18	19	18.5	1947.3	0.18	904.8
*	19	20	19.5	1941.3	0.16	808.9
	20	21	20.5	1934.5	0.14	744.9
	21	22	21.5	1926.8	0.12	678.9
	22	23	22.5	1918.1	0.11	615.2
	23	24	23.5	1908.4	0.10	560.6
*	24	25	24.5	1897.9	0.09	532.2
	25	26	25.5	1885.4	0.07	415.3
	26	27	26.5	1867.8	0.05	286.0

Table 2 CRS modelling results for core GBT-C from the Gotland Basin

		Gamma	Dating	Center		
		Core:	GBT-C		SYSTEM3	
		Date:	980206			
		Data used:	down to 21 cm		Core take:	1997
Slice measured	Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate (g/m2/a)
*	0	1	0.5	1996.5	1.05	279.8
*	1	2	1.5	1995.2	0.57	287.2
*	2	3	2.5	1993.8	0.96	394.3
*	3	4	3.5	1992.2	0.46	245.9
*	4	5	4.5	1990.0	0.44	180.5
*	5	6	5.5	1987.4	0.35	188.8
*	6	7	6.5	1984.2	0.28	174.1
*	7	8	7.5	1981.3	0.44	203.3
*	8	9	8.5	1978.8	0.38	281.7
*	9	10	9.5	1973.3	0.12	116.9
	10	11	10.5	1965.8	0.15	151.1
	11	12	11.5	1960.1	0.22	198.4
*	12	13	12.5	1955.3	0.20	336.4
	13	14	13.5	1949.1	0.13	300.9
	14	15	14.5	1941.1	0.12	258.5
*	15	16	15.5	1932.7	0.12	222.4
	16	17	16.5	1922.2	0.08	192.7
	17	18	17.5	1907.0	0.06	146.8
	18	19	18.5	1885.7	0.04	101.1
*	19	20	19.5	1842.0	0.02	38.6

Table 3 CRS modelling results for core NCBT-B from the North Central Basin

		Gamma	Dating	Center		
		Core:	NCBT-B		SYSTEM3	
		Date:	980207			
		Data used:	down to 17 cm		Core take:	1997
Slice measured	Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate (g/m2/a)
*	0	1	0.5	1996.3	0.74	195.5
*	1	2	1.5	1994.6	0.48	181.0
*	2	3	2.5	1991.4	0.23	143.9
*	3	4	3.5	1987.1	0.23	122.4
*	4	5	4.5	1982.6	0.21	137.8
*	5	6	5.5	1978.0	0.23	221.3
*	6	7	6.5	1973.9	0.25	429.1
*	7	8	7.5	1969.0	0.17	421.7
*	8	9	8.5	1961.6	0.11	448.6
*	9	10	9.5	1952.0	0.10	422.2
	10	11	10.5	1941.0	0.08	369.9
	11	12	11.5	1928.5	0.08	314.9
*	12	13	12.5	1912.9	0.06	235.8
	13	14	13.5	1889.4	0.03	151.6
	14	15	14.5	1850.8	0.02	84.9

Figures

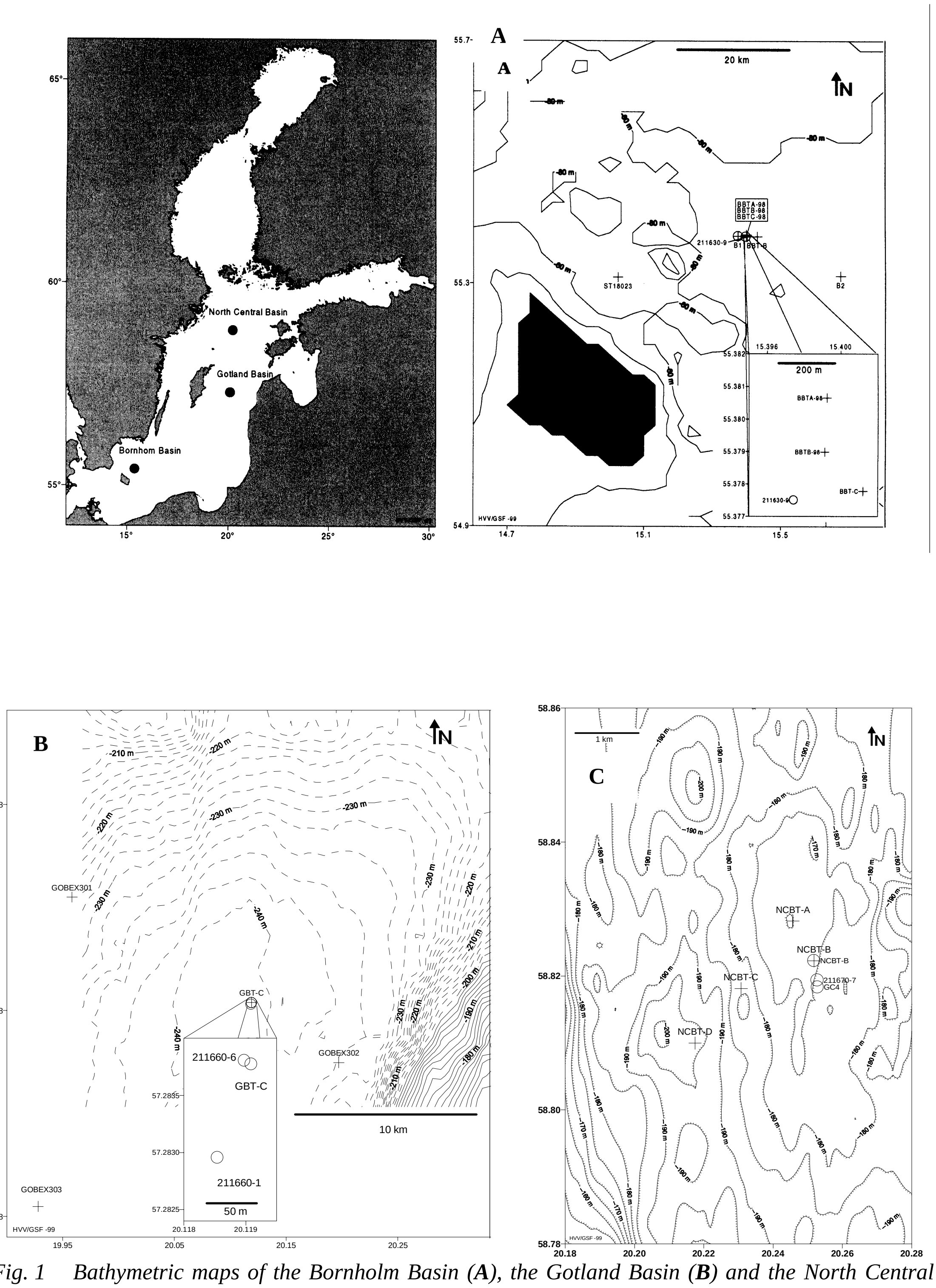


Fig. 1 *Bathymetric maps of the Bornholm Basin (**A**), the Gotland Basin (**B**) and the North Central Basin (**C**) showing the position of sediment coring sites.*

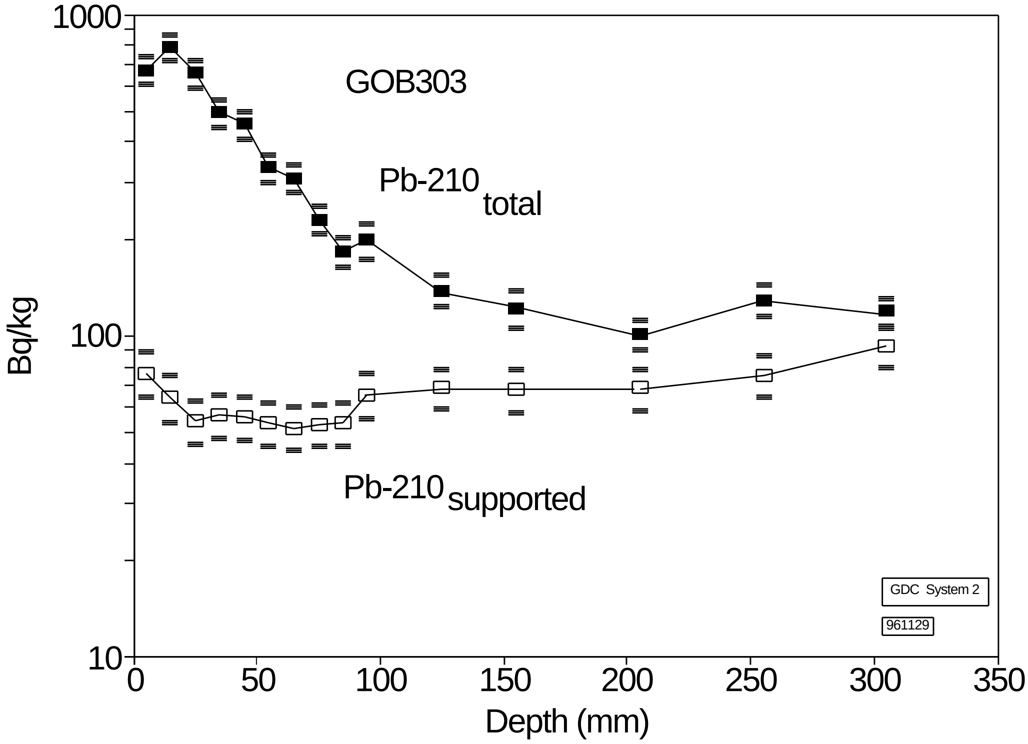


Fig.2 Example of lead-210 activity decline in a sediment core (Gotland Basin core GOB 303).

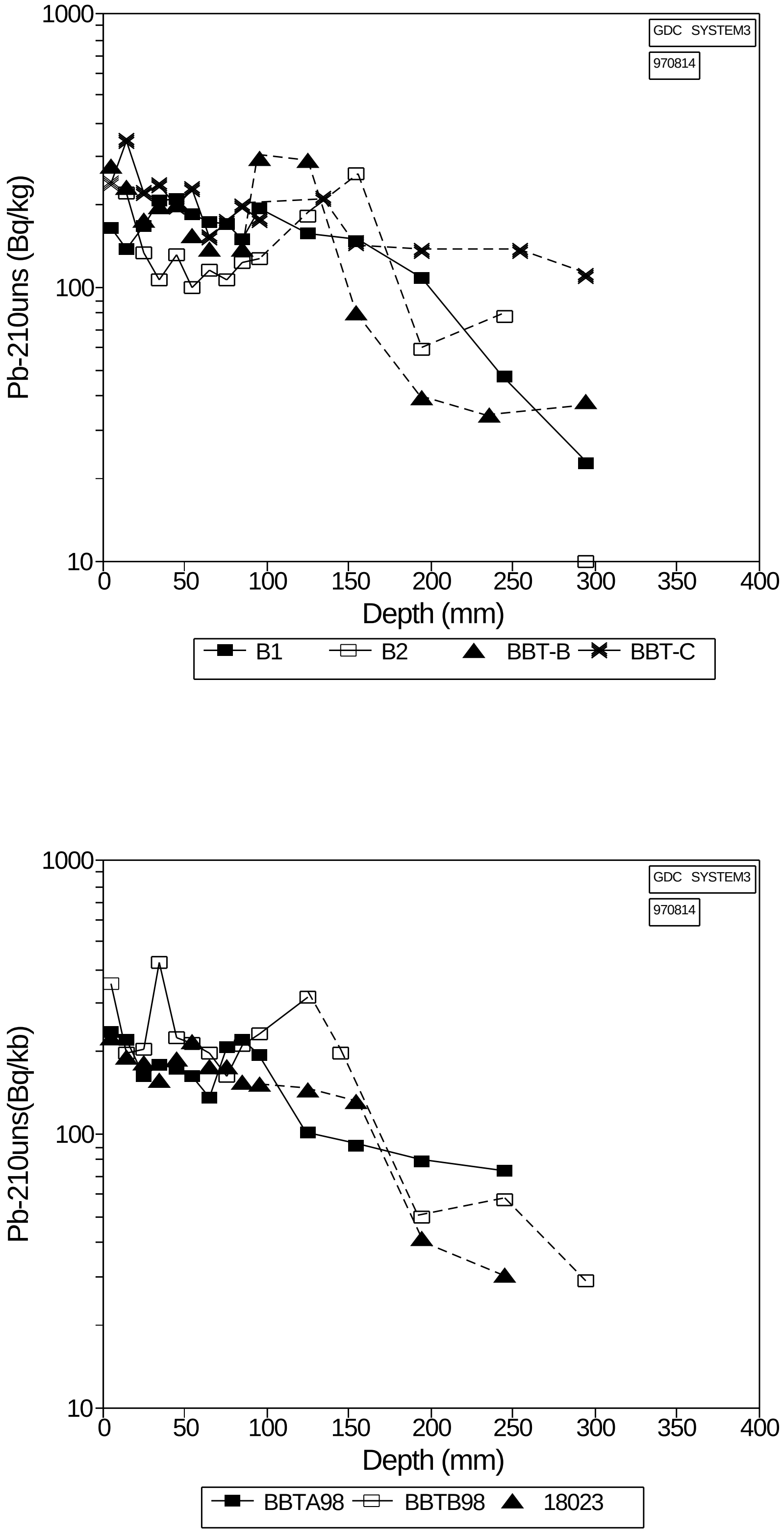
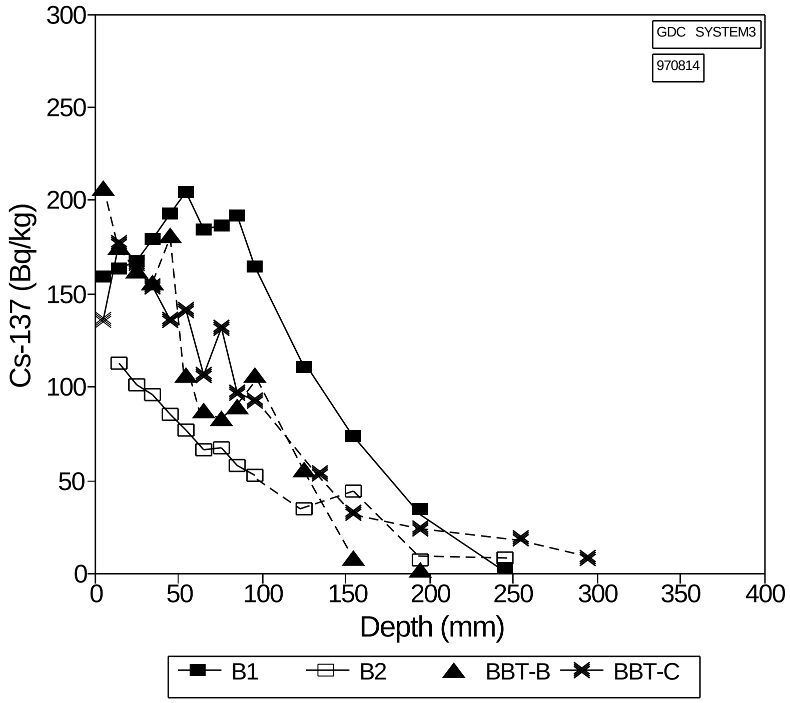


Fig.3 Unsupported lead-210 activities vs. depth for 7 short cores taken in the Bornholm Basin.



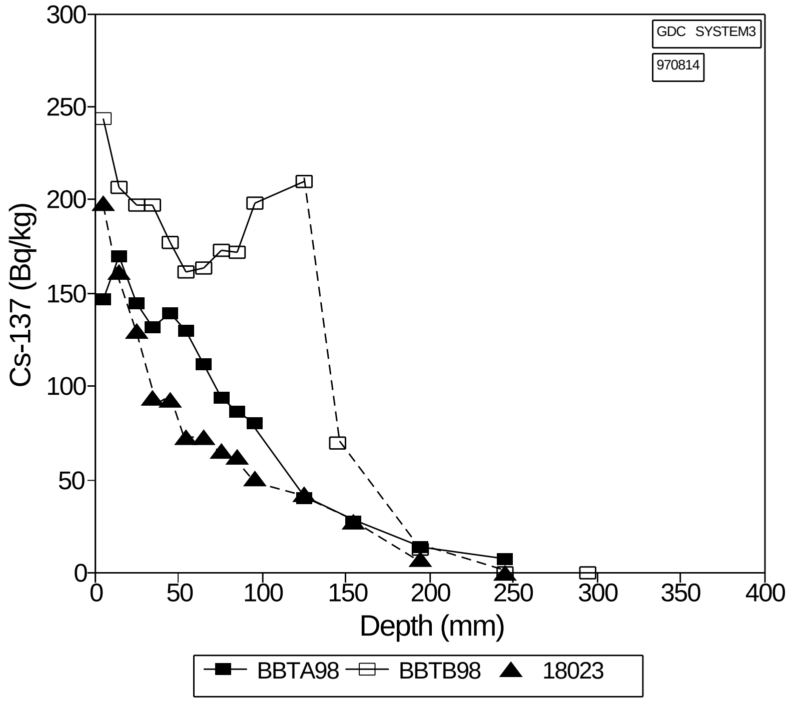


Fig.4 Cs-137 activities of 7 cores from the Bornholm Basin plotted against core depth.

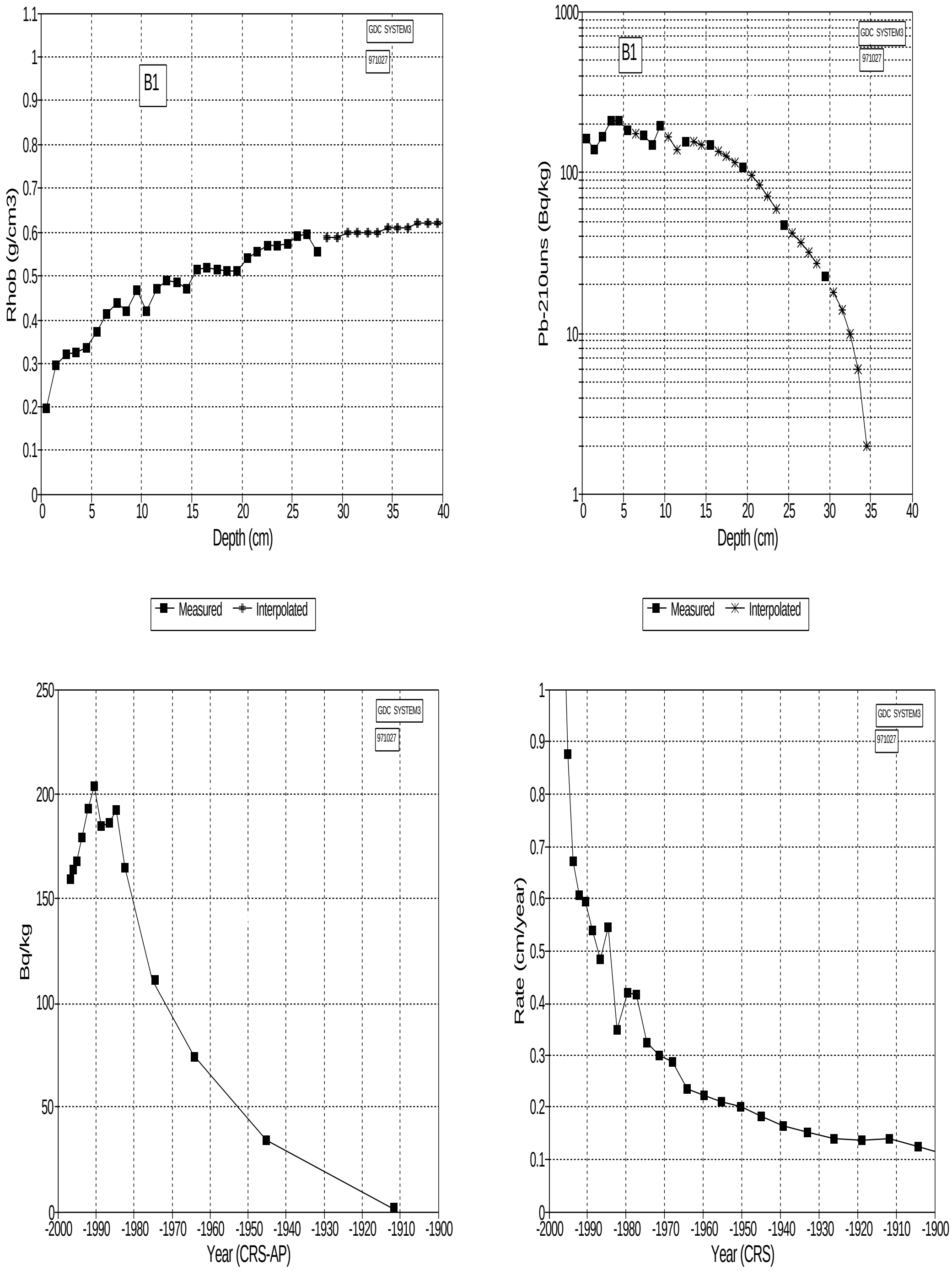
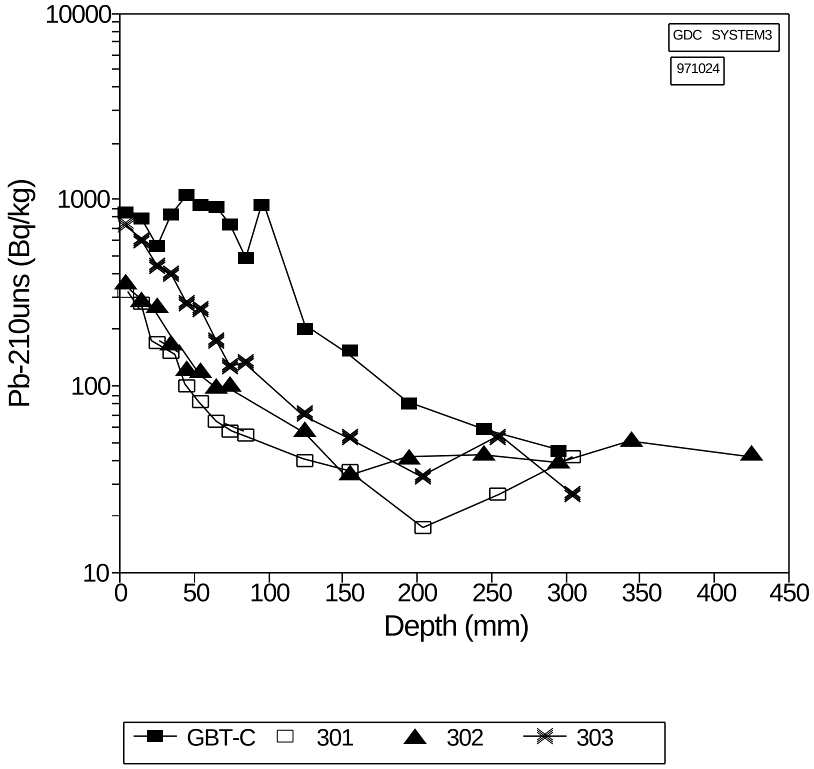


Fig. 5 CRS modelling results for Bornholm Basin core B1 plotted in the lower part while model input data (dry bulk density and unsupported lead-210) are plotted in the upper part.



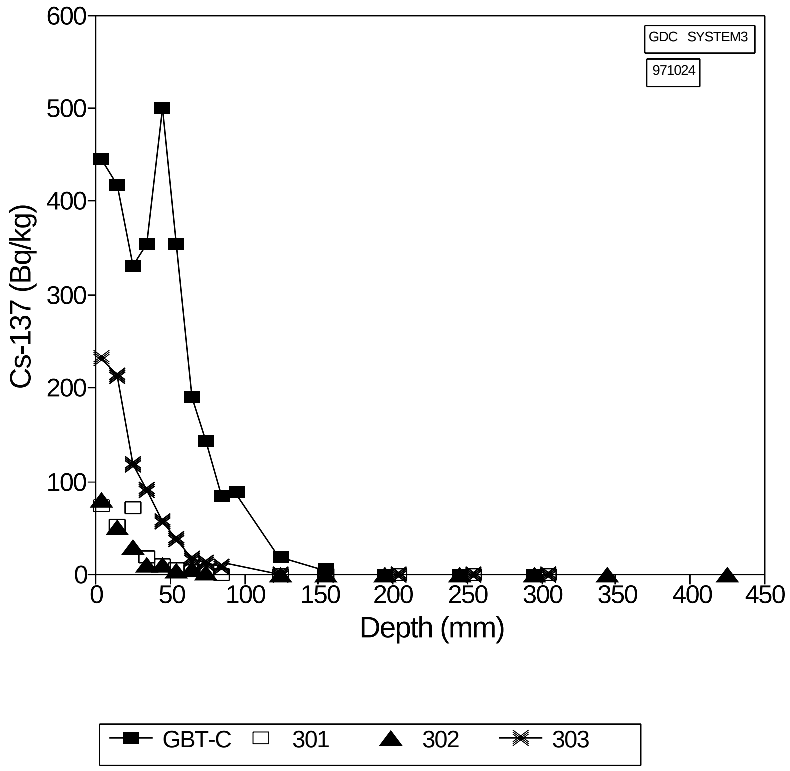
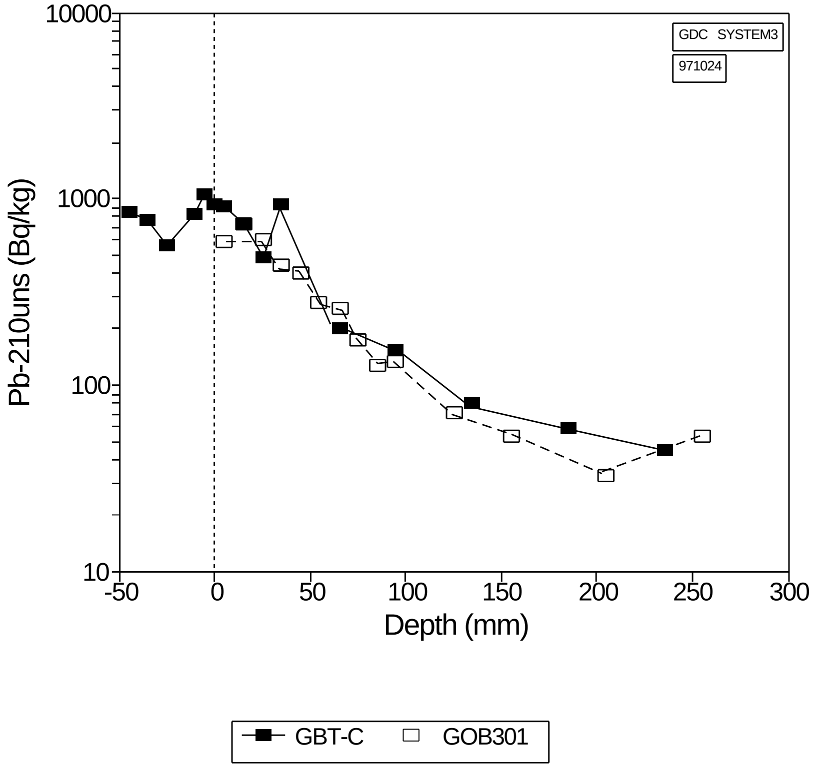


Fig.6 Unsupported lead-210 activities 4 short cores taken in the Gotland Basin (upper part) and Cs-137 activities (lower part) plotted vs. depth.



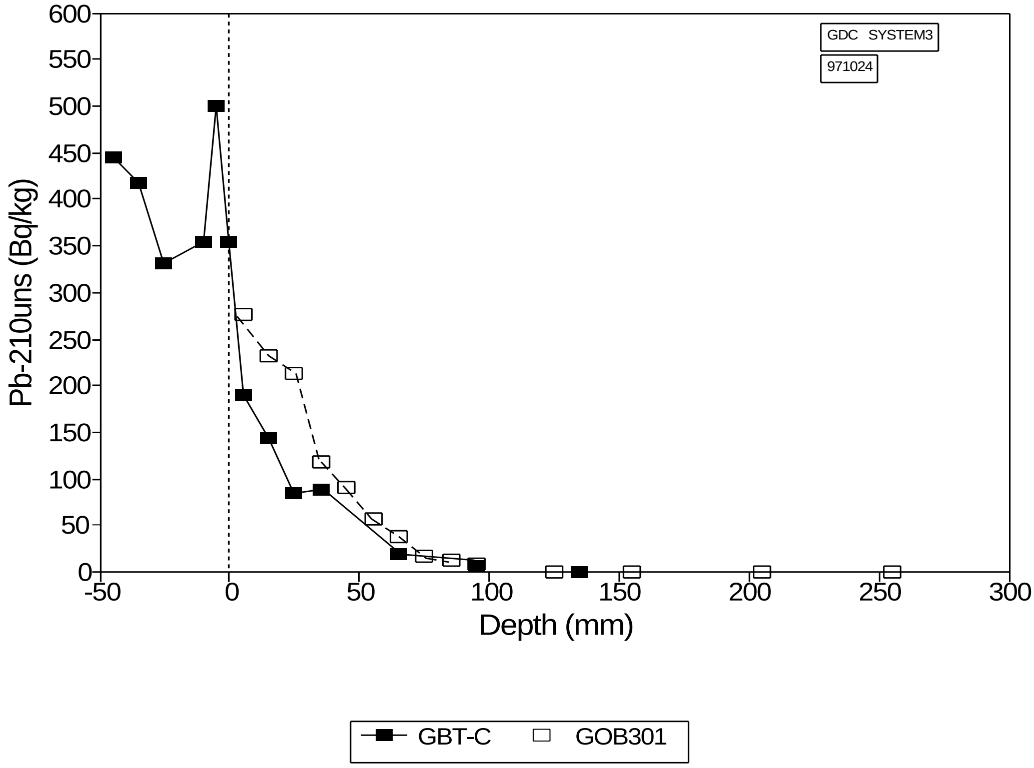


Fig. 7 Curves (unsupported lead-210 and Cs-137) of two cores from the Gotland Basin displaying that differing curves shown in fig. 6 may be expained through varying fluffy layers on top of the cores.

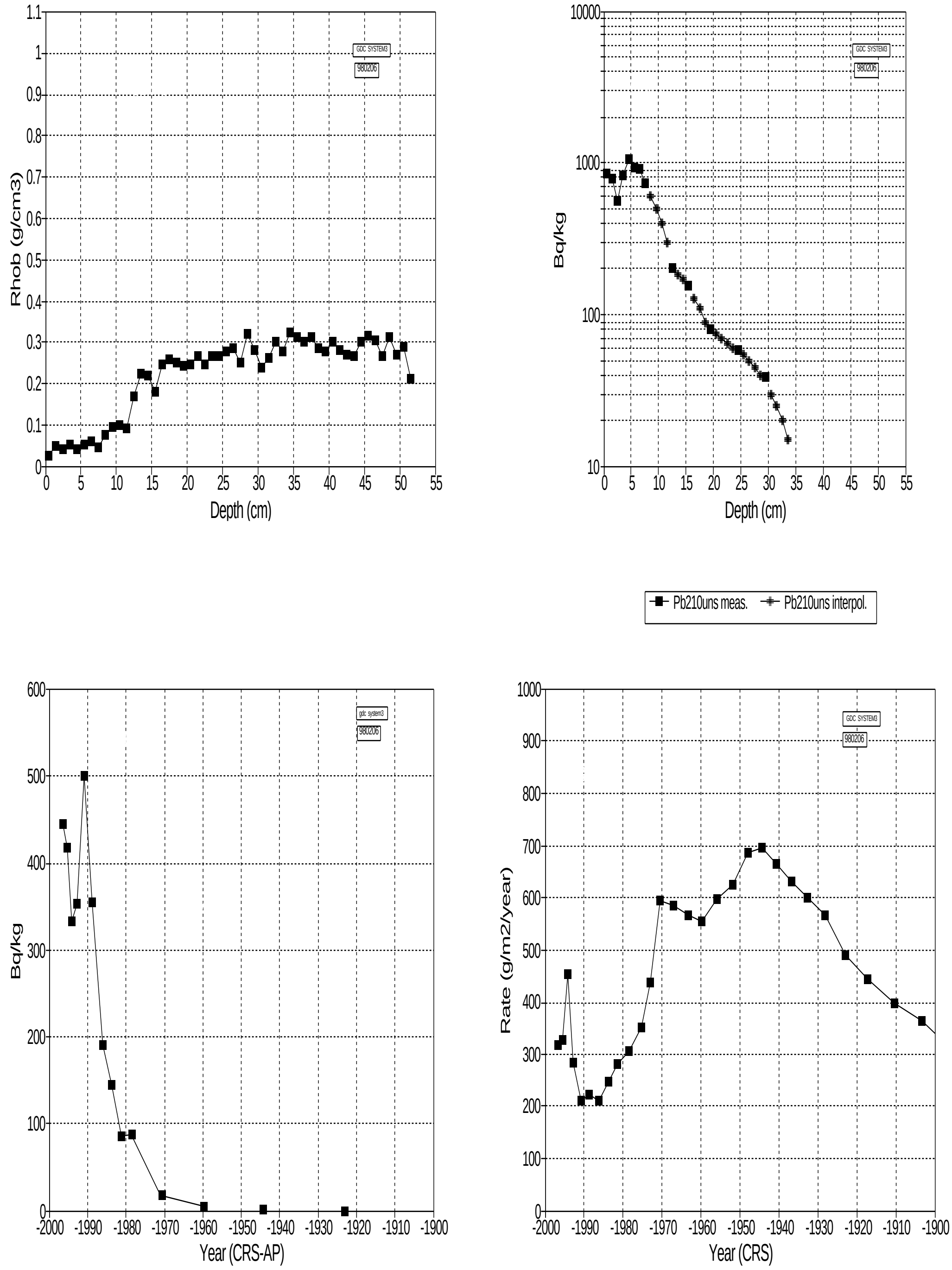


Fig.8 CRS modelling results for Gotland Basin core GBT-C plotted in the lower part while model input data (dry bulk density and unsupported lead-210) are plotted in the upper part.

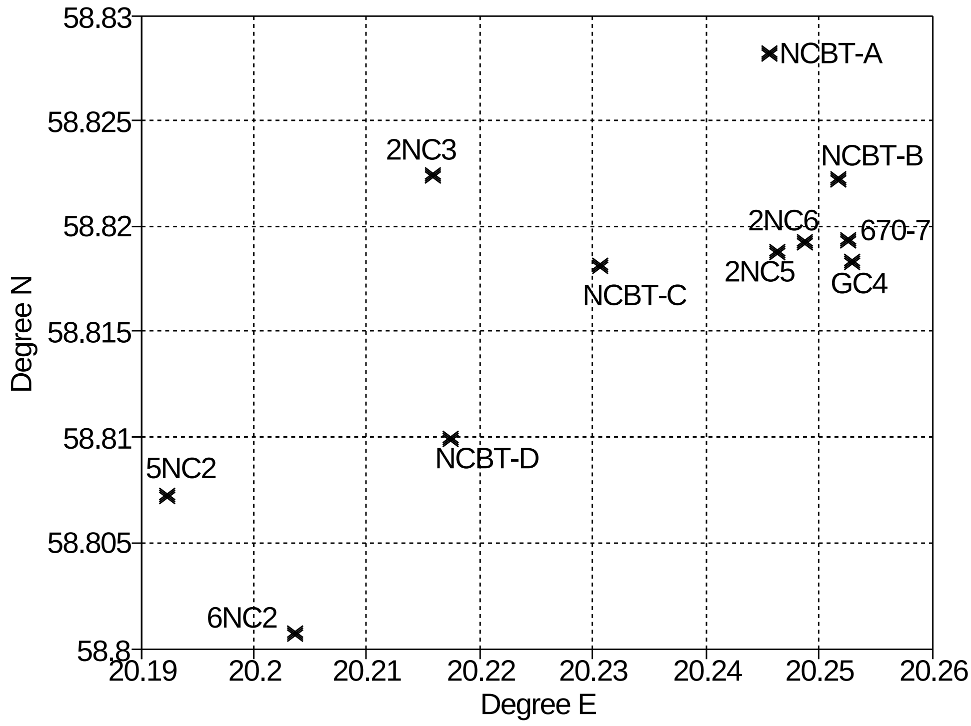
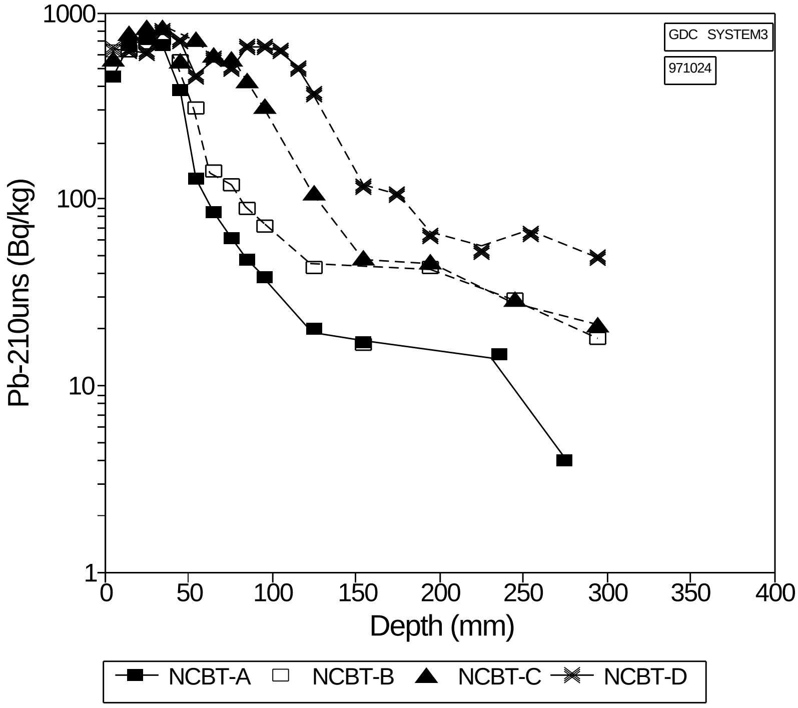


Fig. 9 Position of all short cores taken in the North Central Basin area.



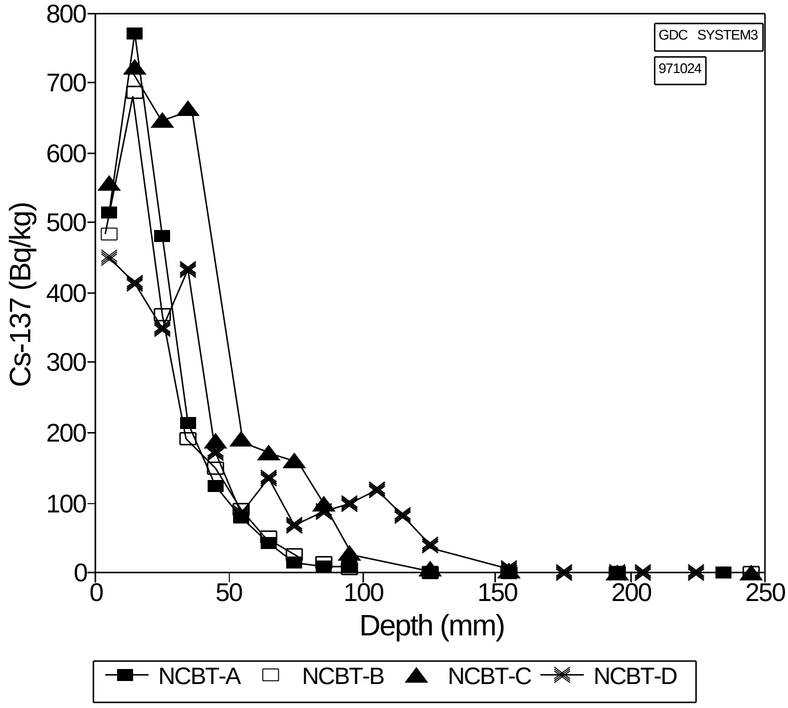


Fig. 10 Unsupported lead-210 activities of 4 short cores taken in the North Central Basin (upper part) and Cs-137 activities (lower part) plotted vs. depth.

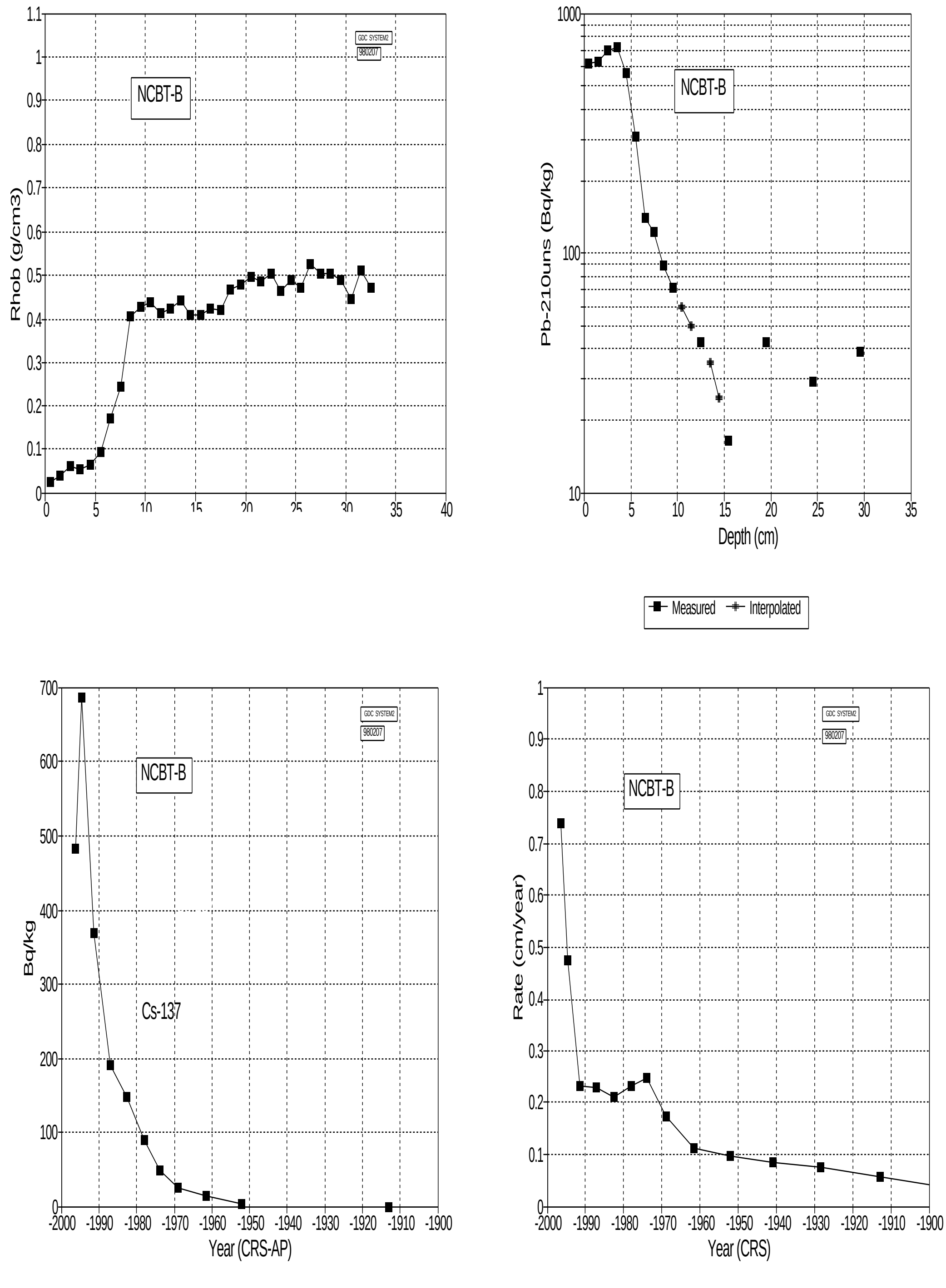
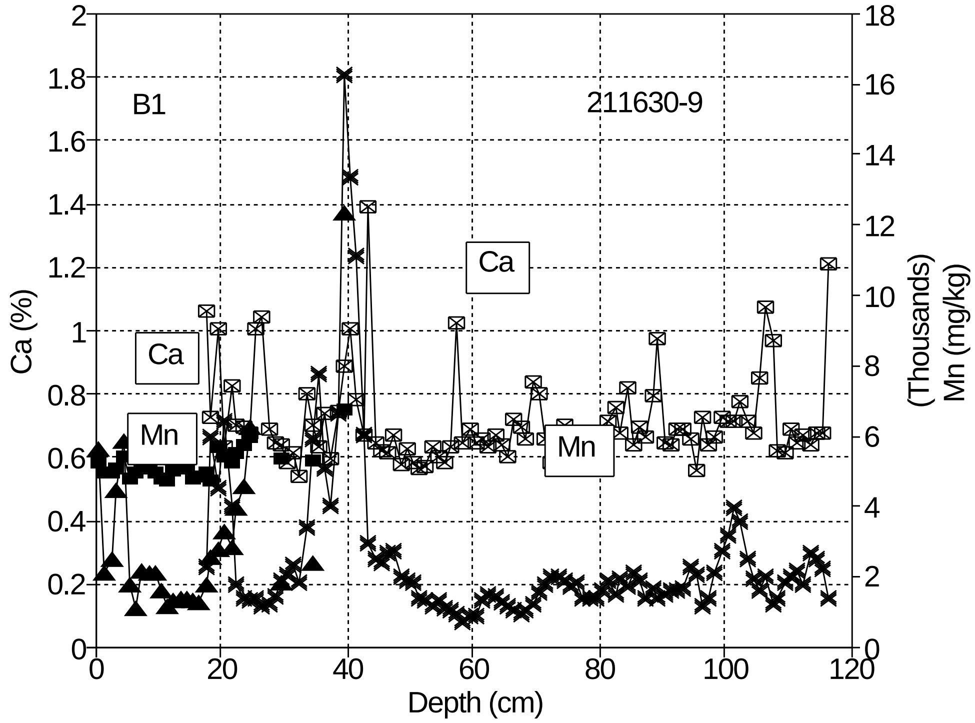


Fig. 11 CRS modelling results for North Central Basin core NCBT-B plotted in the lower part while model input data (dry bulk density and unsupported lead-210) are plotted in the upper part.



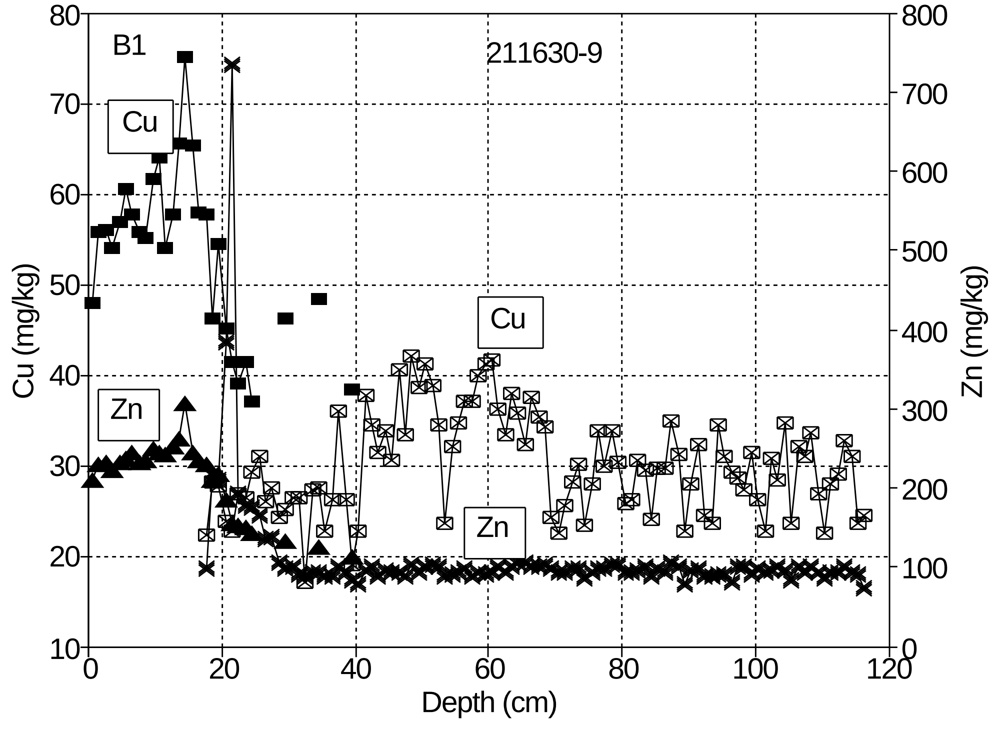
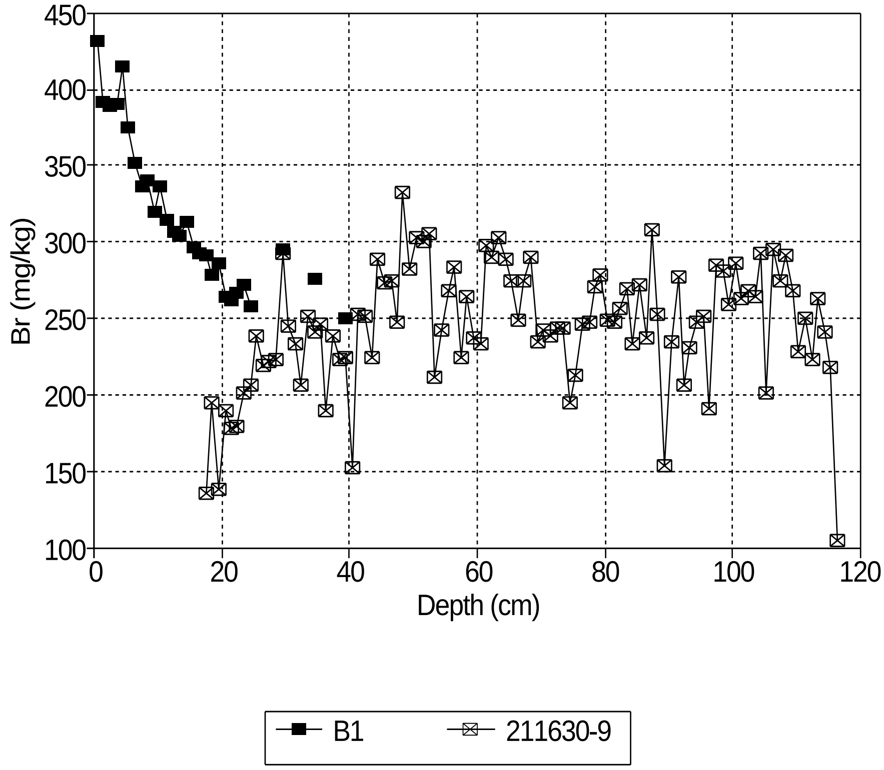


Fig. 12 Distributions of Ca and Mn (upper part of figure) in the upper 1.2 m of the Bornholm Basin deep coring site constructed by using the short core B1 and the upper 1 m of core 211630-9. The distributions of Cu and Zn are shown in the lower part of the figure.



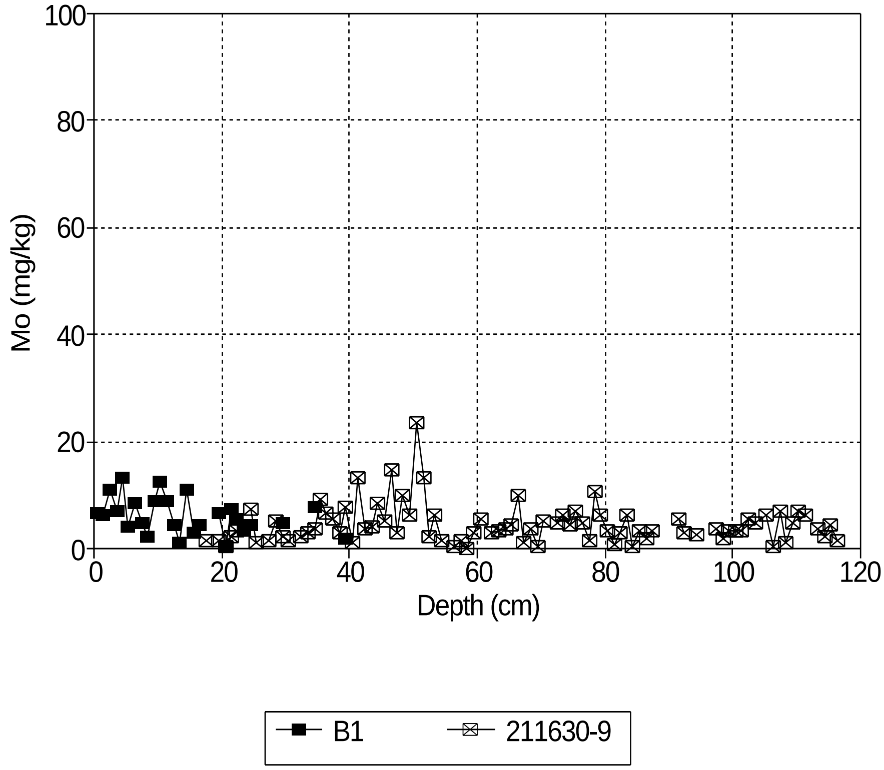
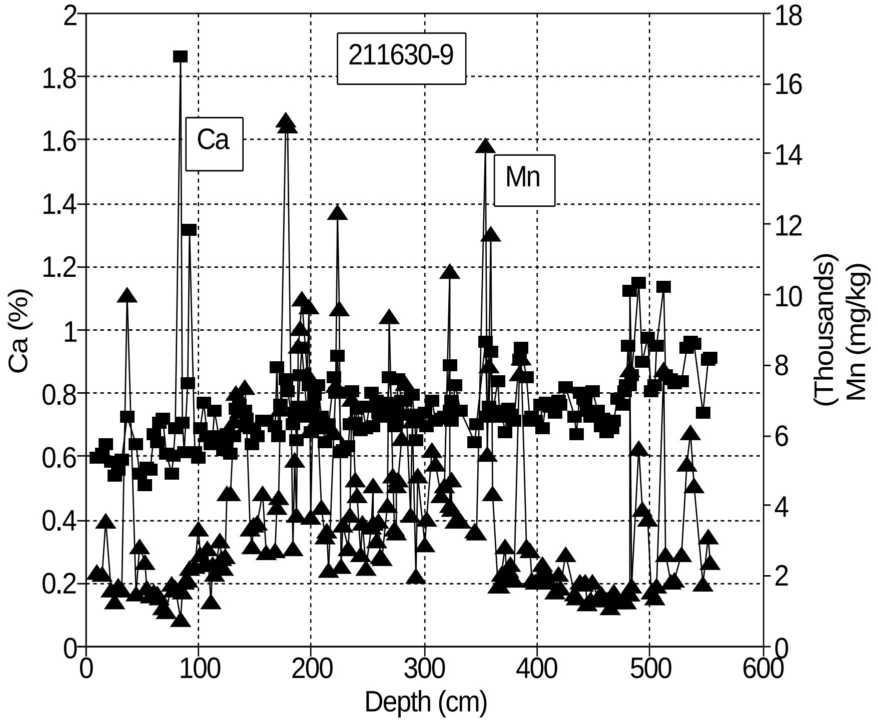


Fig. 13 Distribution of Br (upper part of figure) in the upper 1.2 m of the Bornholm Basin deep coring site constructed by using the short core B1 and the upper 1 m of core 211630-9. The distribution of Mo is shown in the lower part of the figure.



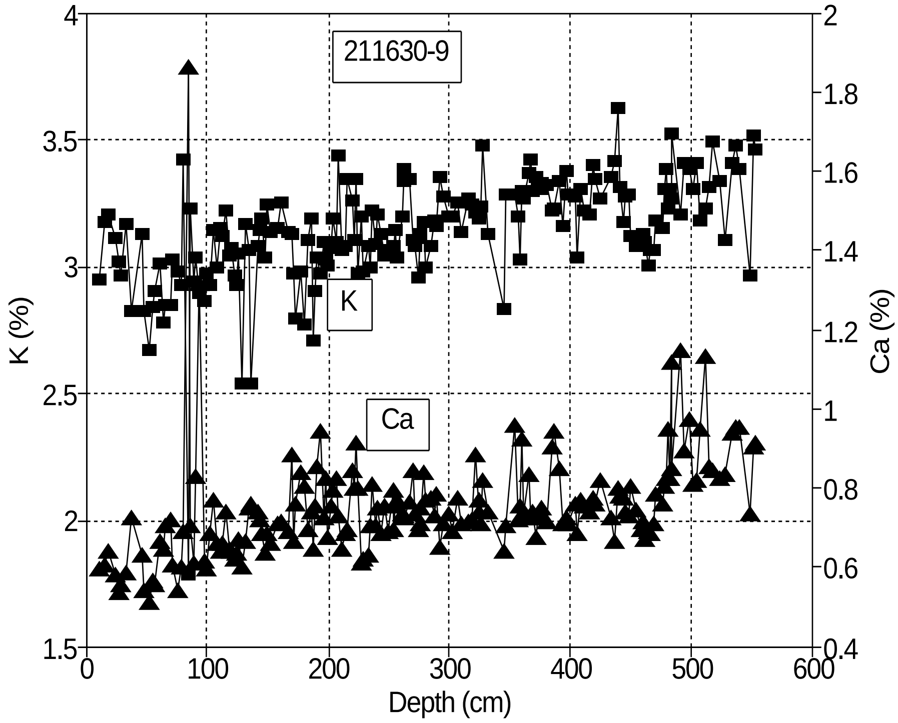
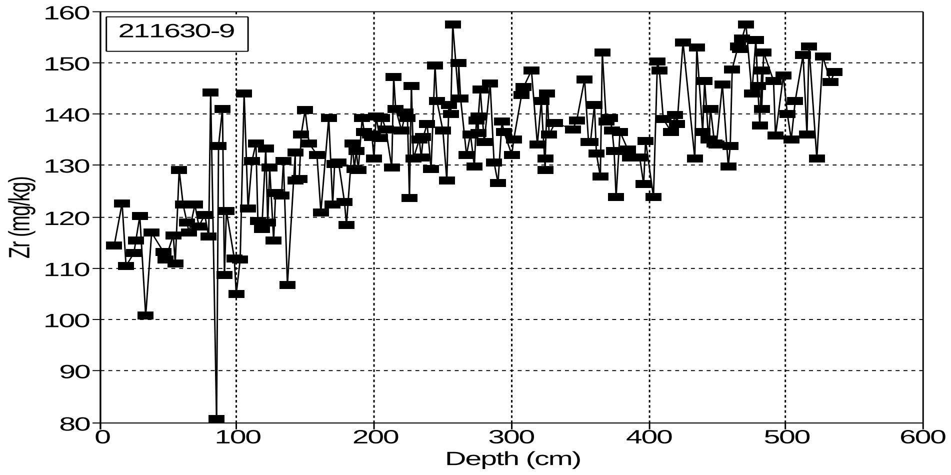
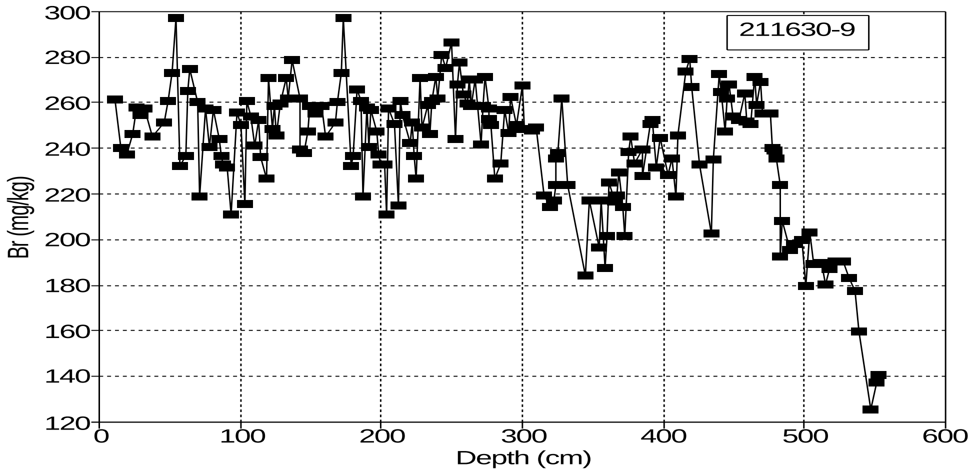


Fig. 14 Distributions of Ca and Mn (upper part of the figure) in the long core of the Bornholm Basin based on sediment material from cubes that have been used for the paleomagnetic measurements. The distibutions of K and Ca are plotted in the lower part of the figure.





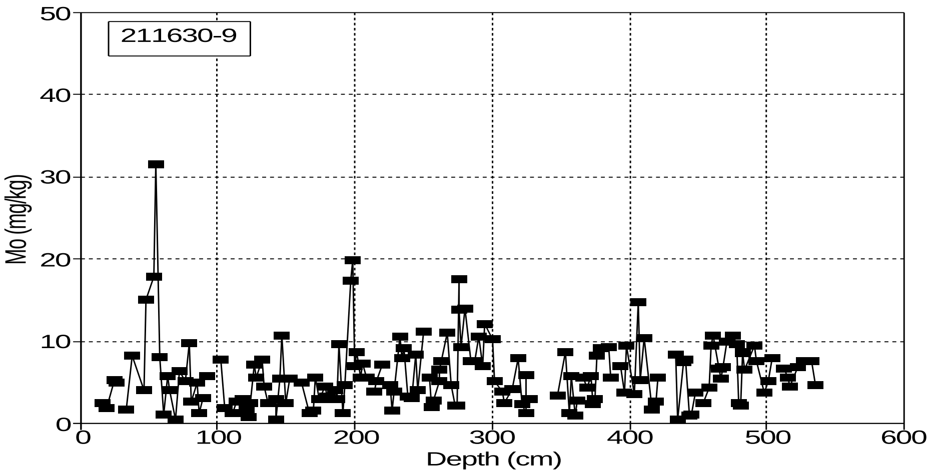


Fig. 15 Distributions of Zr, Br and Mo in the long core of the Bornholm Basin based on sediment material from cubes that have been used for the paleomagnetic measurements.

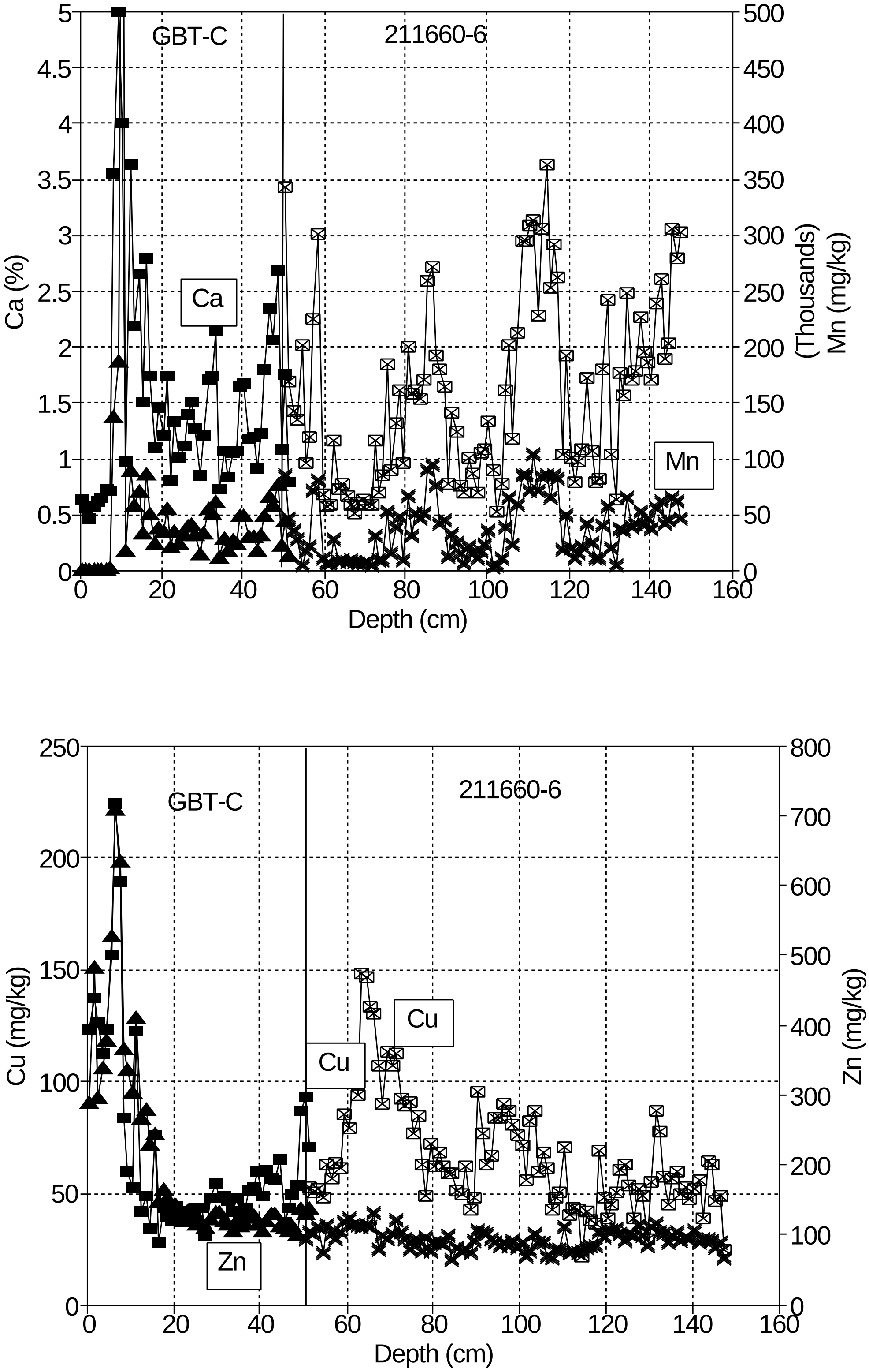
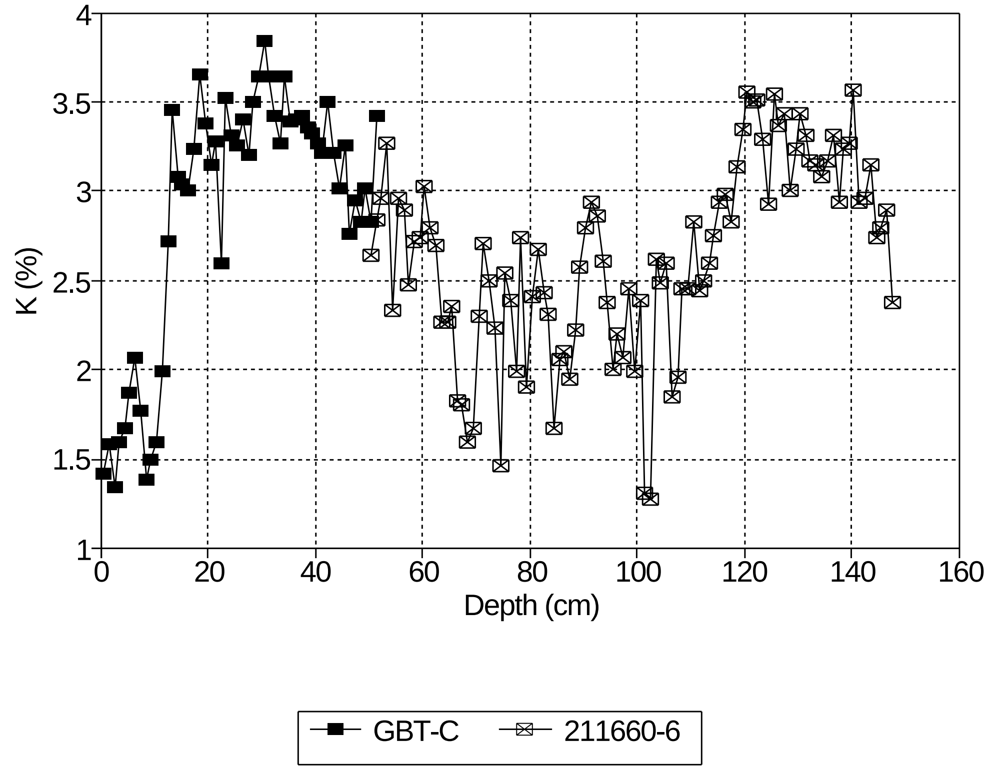


Fig. 16 Distributions of Ca and Mn (upper part of figure) in the upper 1.5 m of the Gotland Basin deep coring site constructed by using the short core GBT-C and the upper 1 m of core 211660-6. The distributions of Cu and Zn are shown in the lower part of the figure.



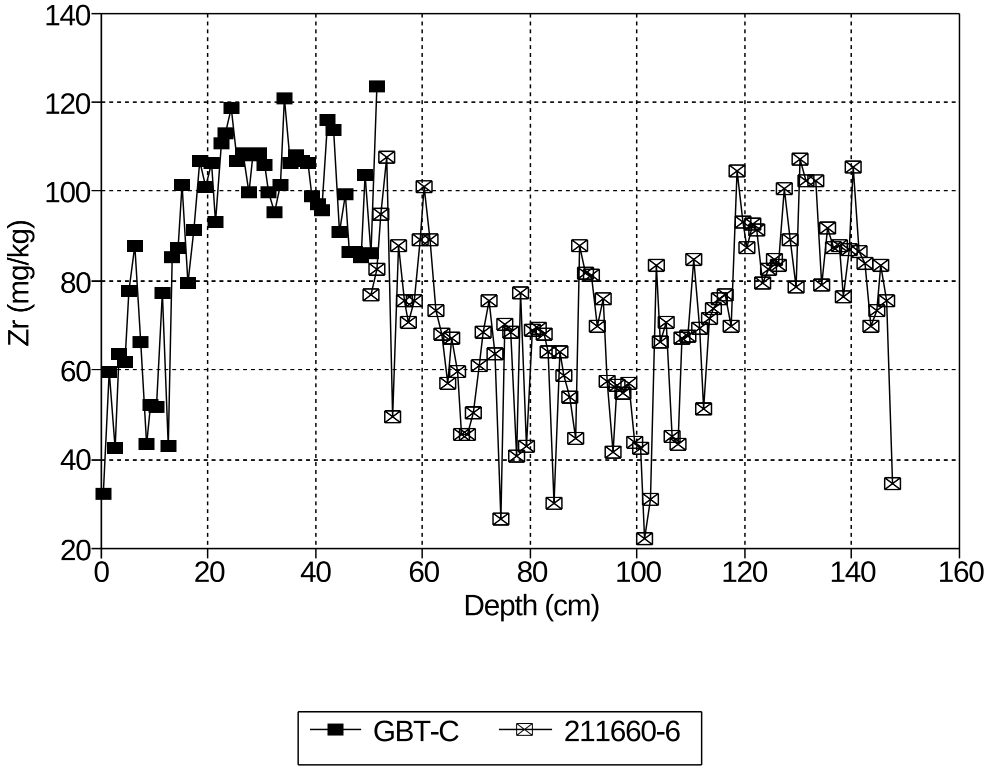
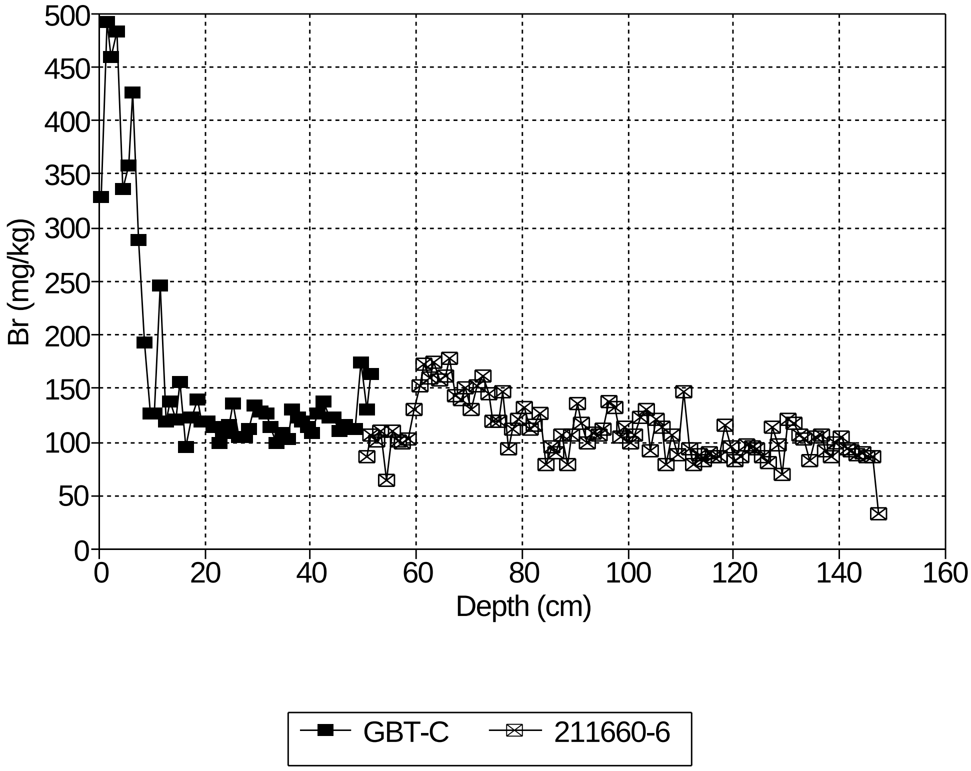


Fig. 17 Distribution of K (upper part of figure) in the upper 1.5 m of the Gotland Basin deep coring site constructed by using the short core GBT-C and the upper 1 m of core 211660-6. The distribution of Zr is shown in the lower part of the figure.



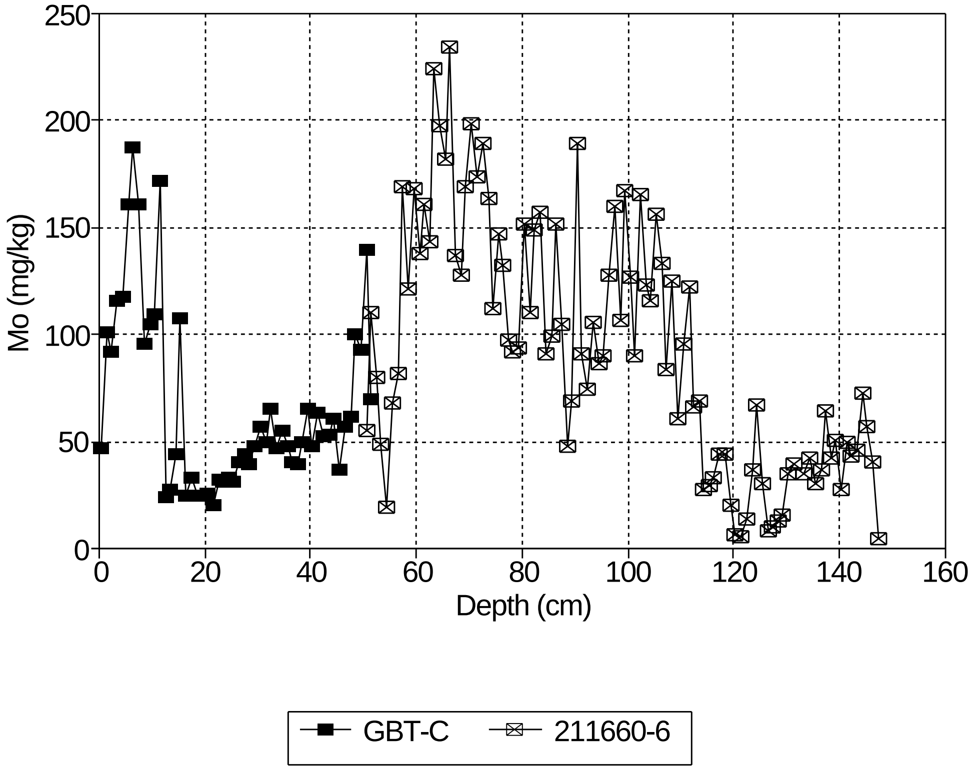


Fig. 18 Distribution of Br (upper part of figure) in the upper 1.5 m of the Gotland Basin deep coring site constructed by using the short core GBT-C and the upper 1 m of core 211660-6. The distribution of Mo is shown in the lower part of the figure.

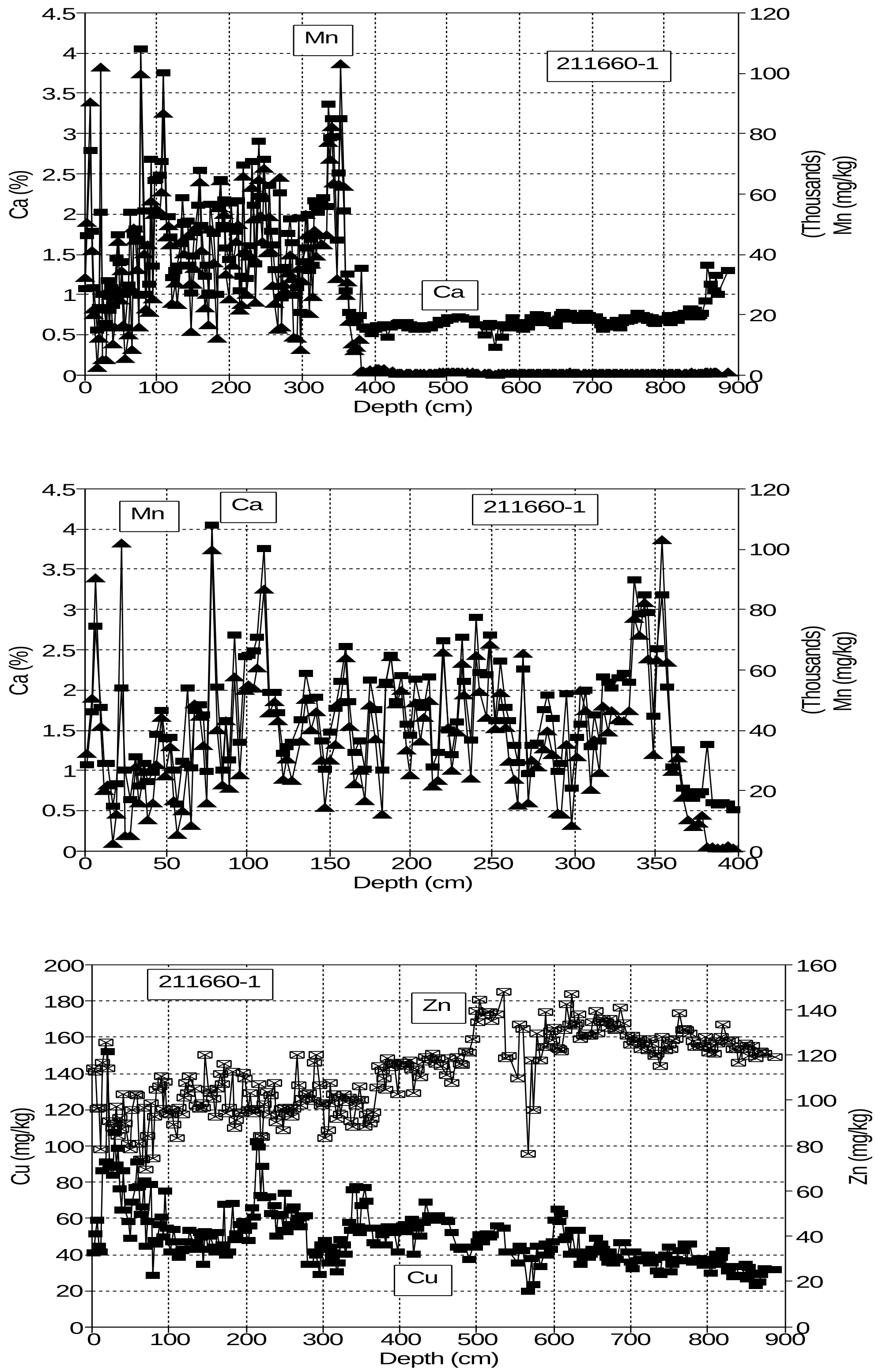


Fig. 19 Distributions of Ca and Mn (upper part of the figure) in the long piston core 211660-1 of the Gotland Basin based on sediment material from cubes that have been used for the paleomagnetic measurements. These data are re-plotted for the upper part of the core section (middle part of the figure) to show the alternating Ca-Mn peaks. Cu and Zn distibutions are plotted in the lower part of the figure.

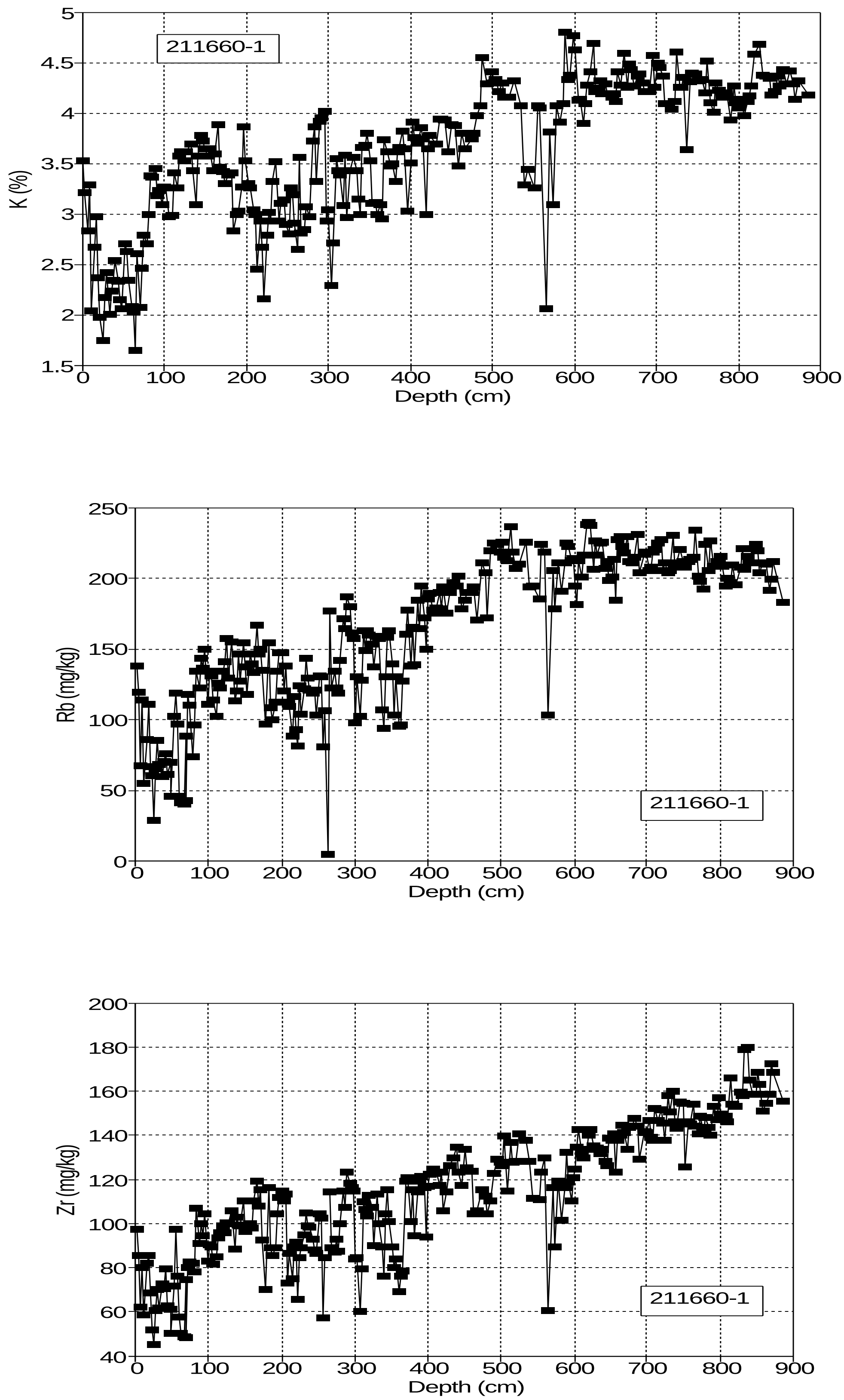
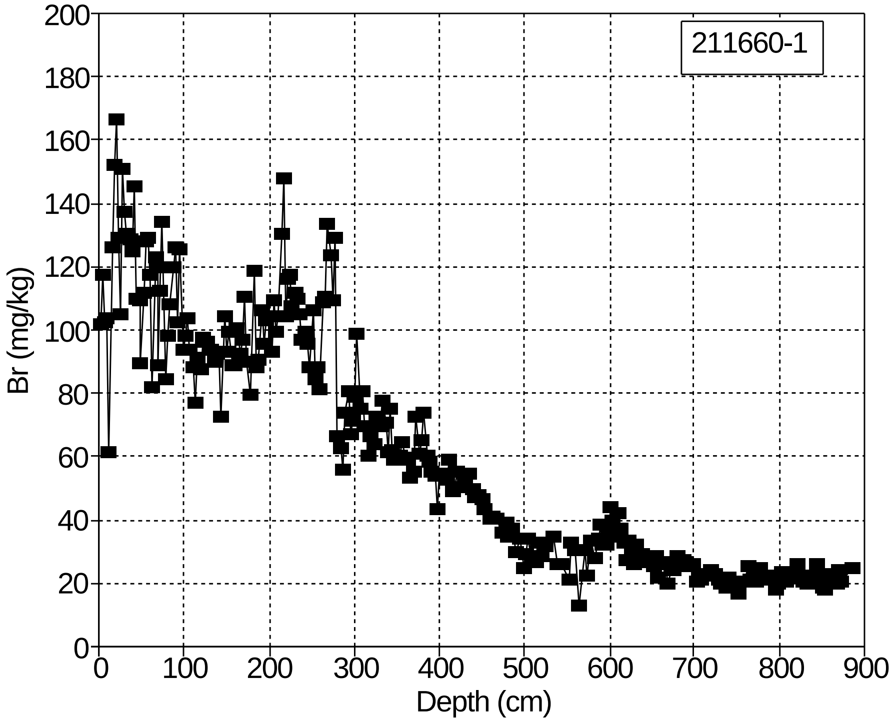


Fig. 20 Distributions of K, Rb and Zr along the long piston core 211660-1 of the Gotland Basin based on sediment material from cubes that have been used for the paleomagnetic measurements.



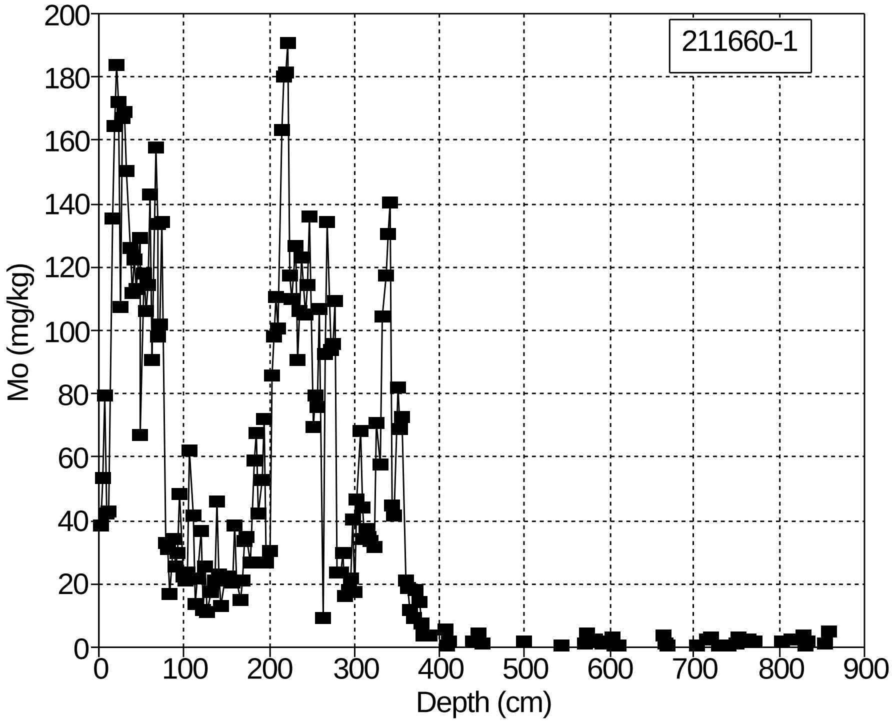


Fig. 21 Distributions of Br and Mo along the long piston core 211660-1 of the Gotland Basin based on sediment material from cubes that have been used for the paleomagnetic measurements.

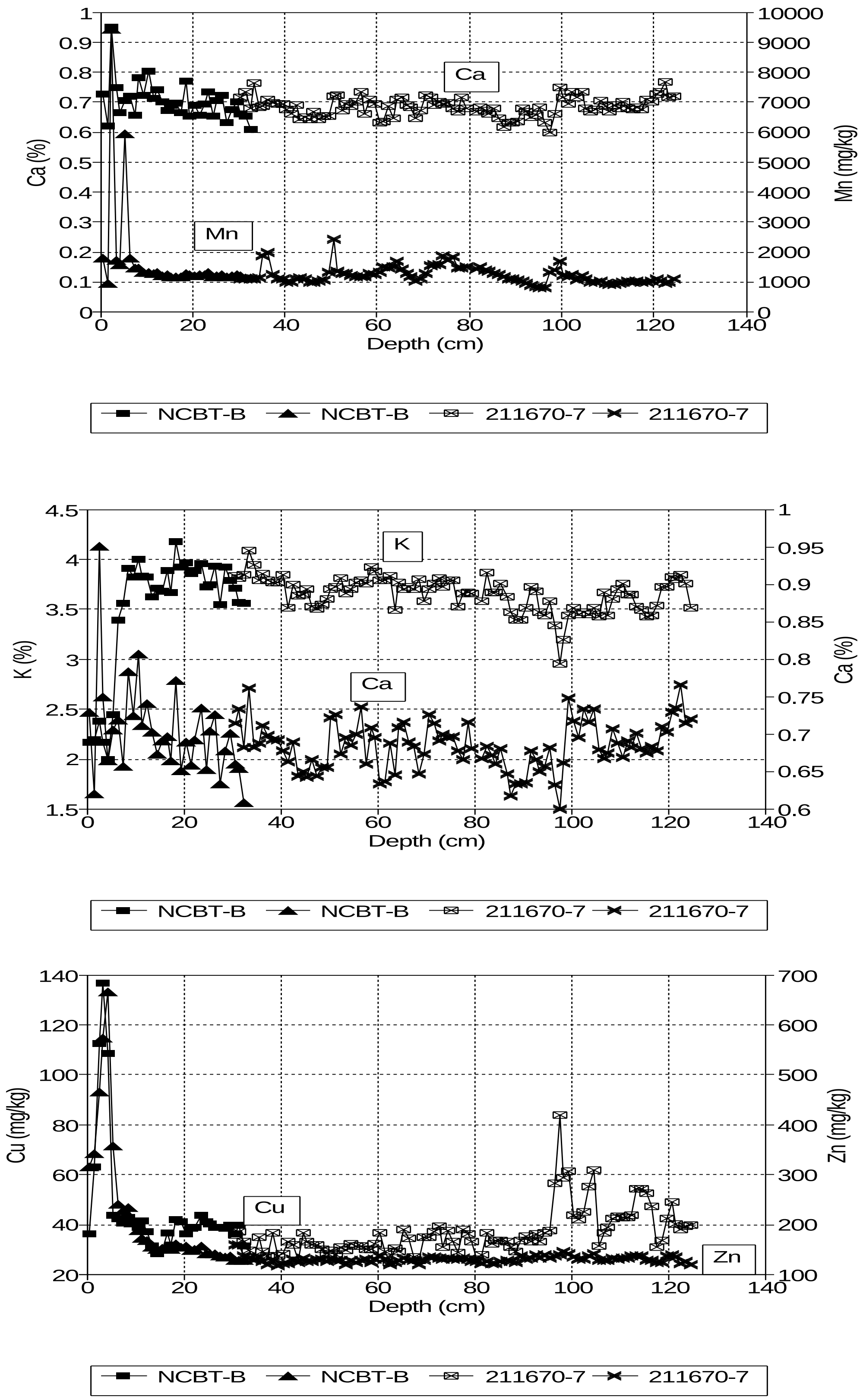


Fig. 22 Distributions of Ca and Mn (upper part of figure) and K and Ca (middle part) in the upper 1.2 m of the North Central Basin deep coring site constructed by using the short core NCBT-B and the upper 1 m of core 211670-7. The distributions of Cu and Zn are shown in the lower part of the figure.

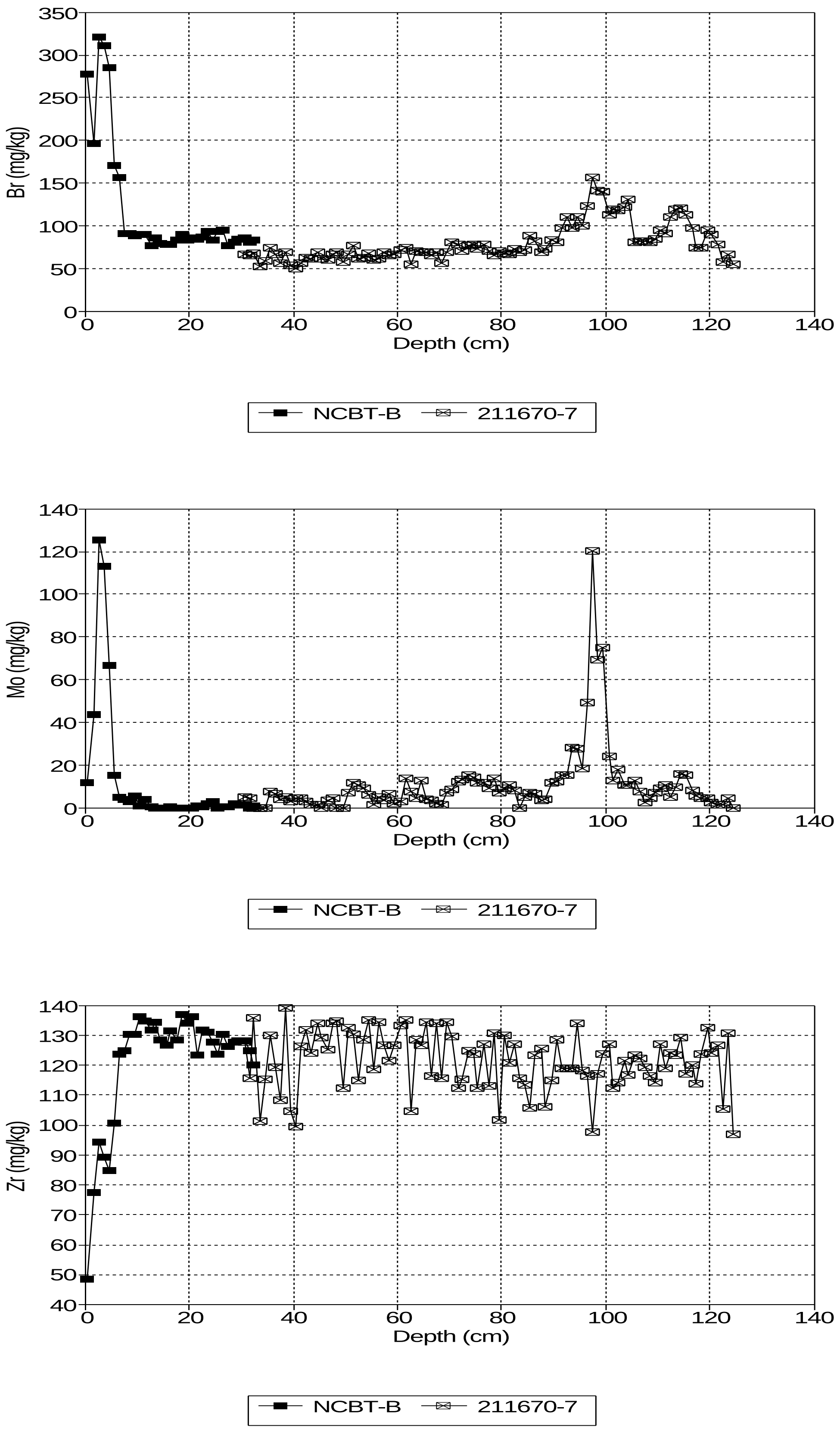


Fig. 23 Distributions of Br, Mo and Zr in the upper 1.2 m of the North Central Basin deep coring site constructed by using the short core NCBT-B and the upper 1 m of core 211670-7.

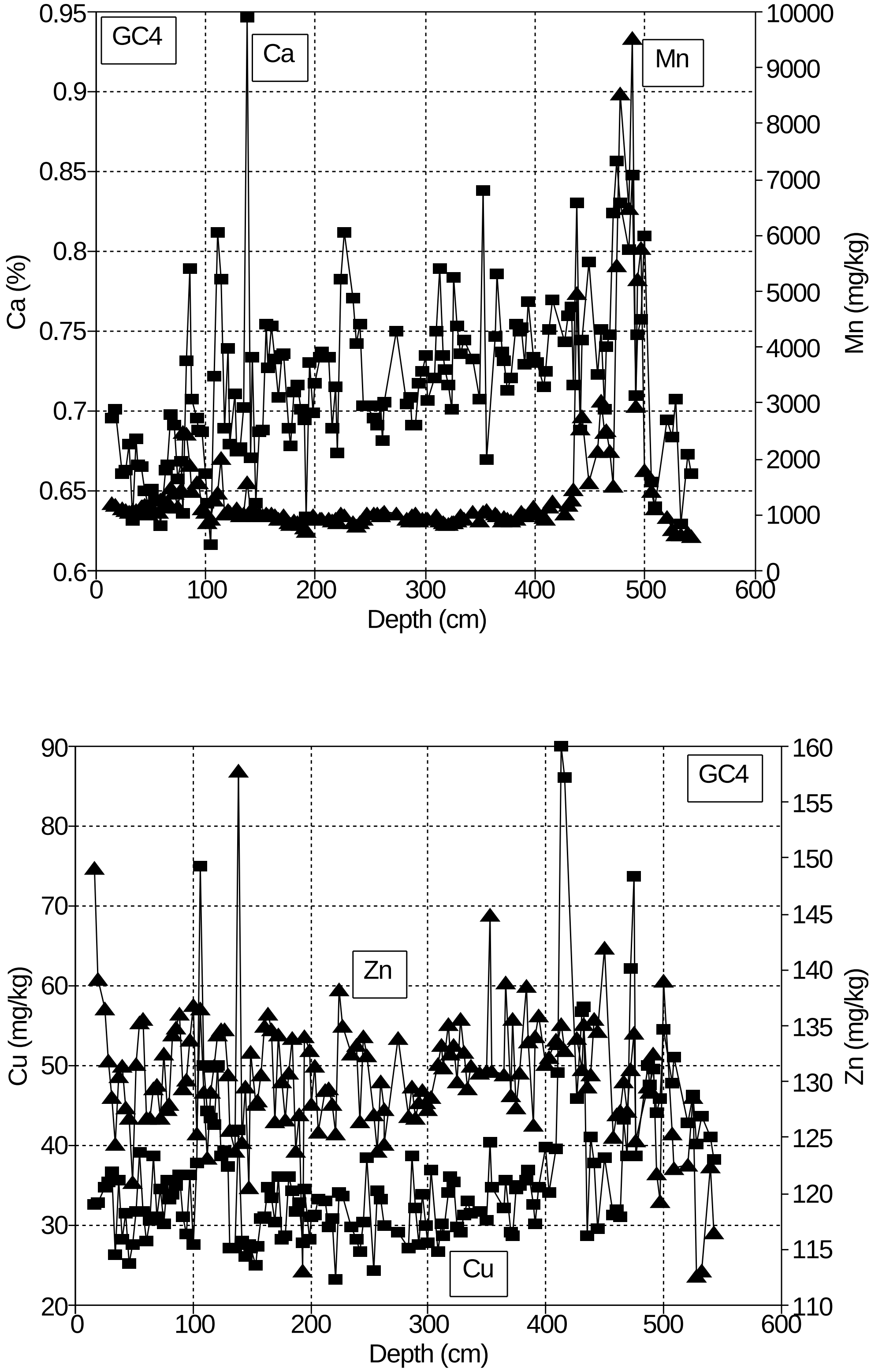
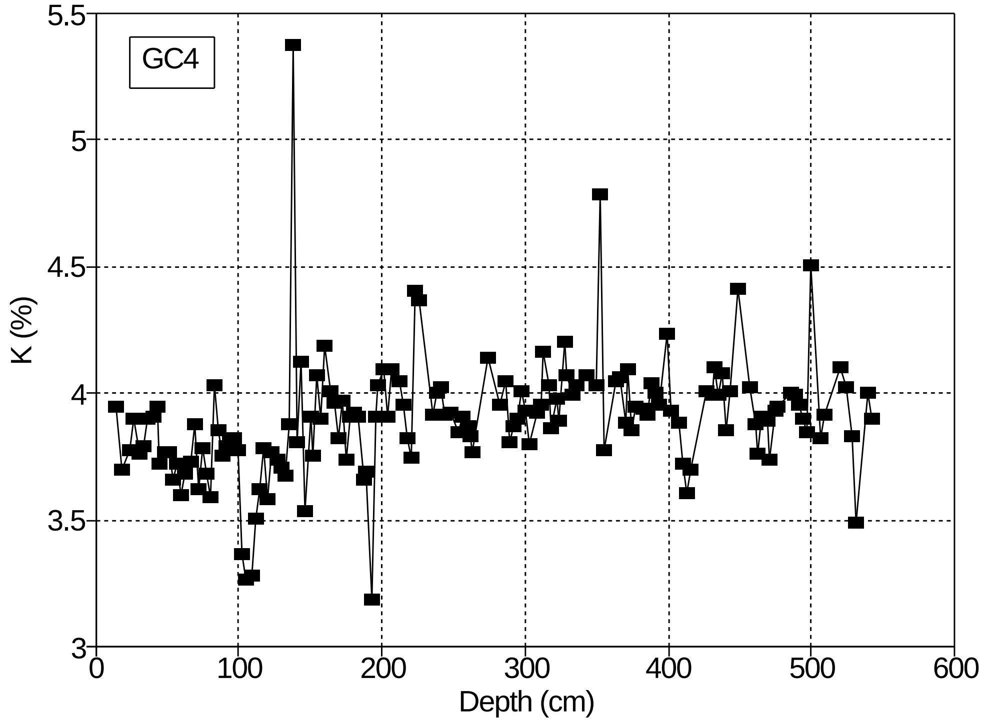


Fig. 24 Distributions of Ca and Mn (upper part of the figure) in the long gravity core GC4 of the North Central Basin based on sediment material from cubes that have been used for the paleomagnetic measurements. Cu and Zn distibutions are plotted in the lower part of the figure.



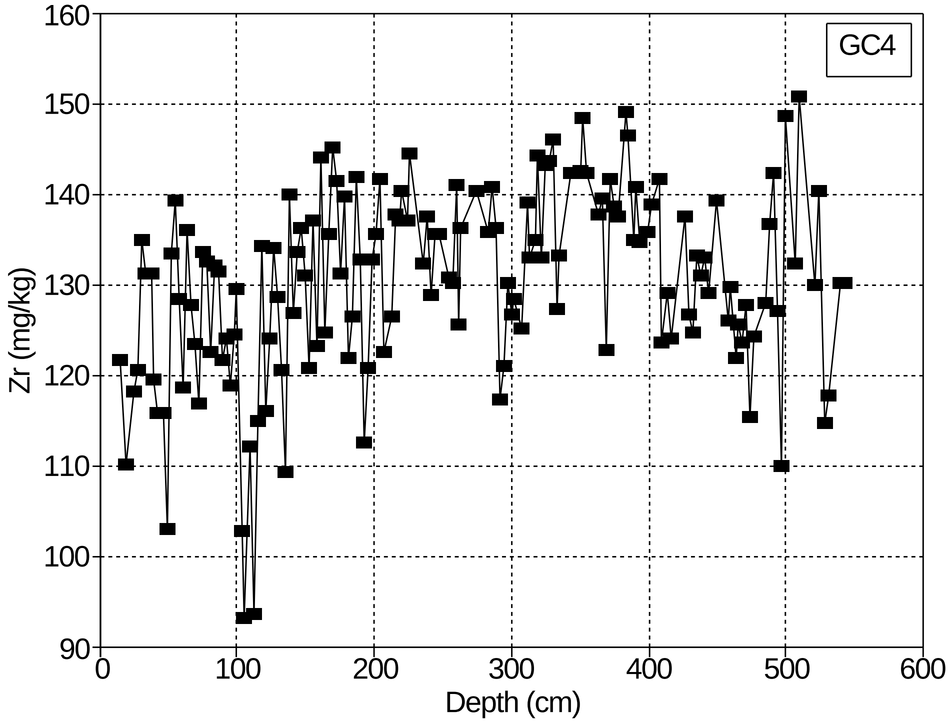
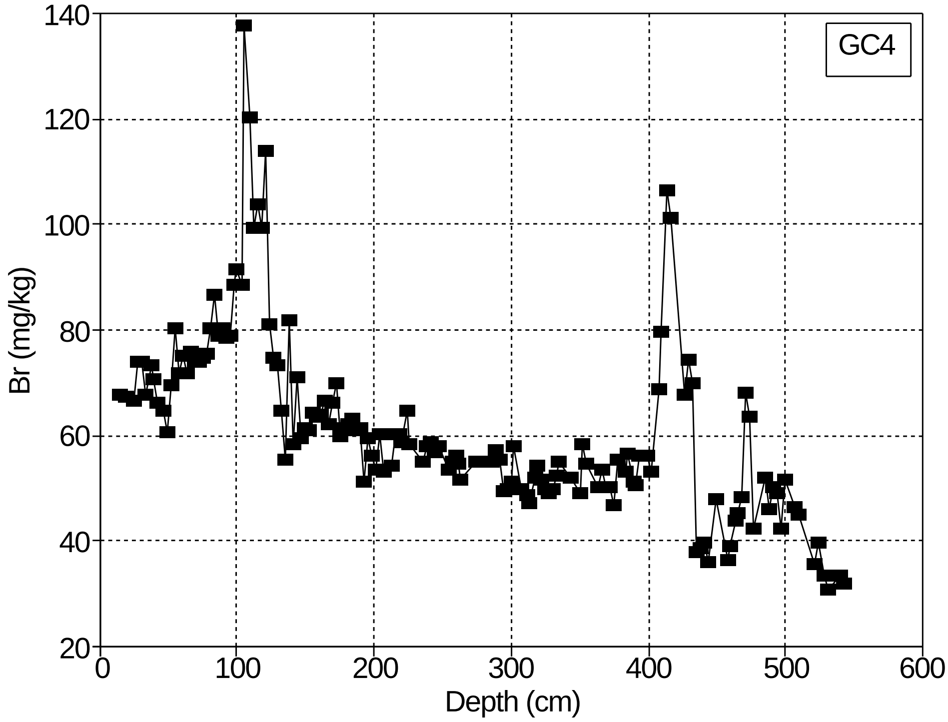


Fig. 25 Distributions of K and Zr along the gravity core GC4 of the North Central Basin based on sediment material from cubes that have been used for the paleomagnetic measurements.



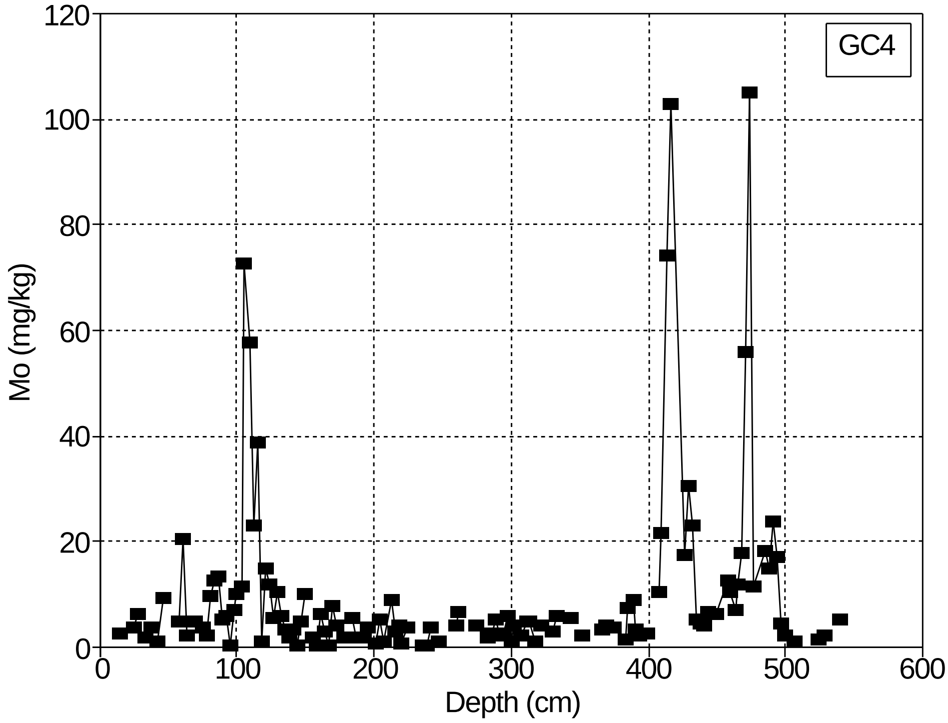
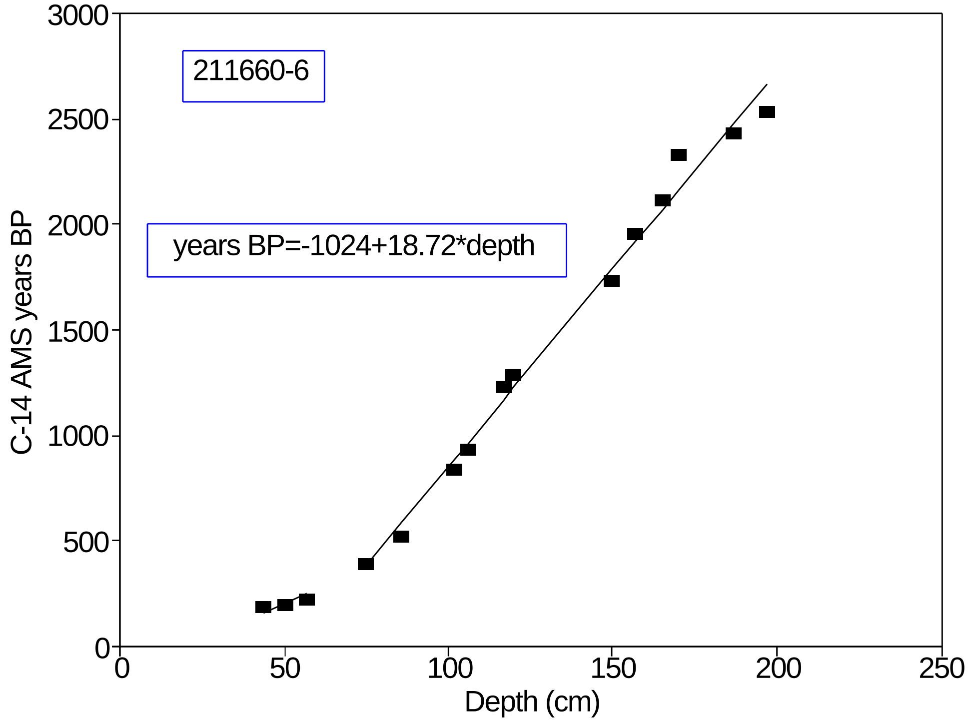


Fig. 26 Distributions of Br and Mo along the gravity core GC4 of the North Central Basin based on sediment material from cubes that have been used for the paleomagnetic measurements.



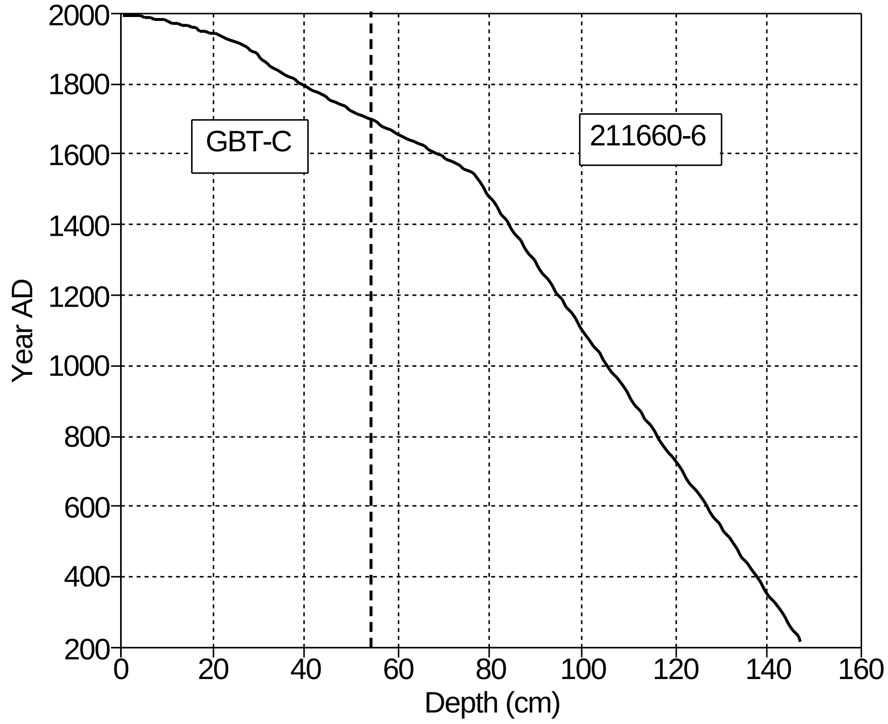


Fig. 27 *^{14}C (AMS) age vs. depth for the 1-m section of core 211660-6 (upper part) and age model based on ^{210}Pb and ^{14}C datings for the uppermost section of the Gotland Basin core (lower part).*

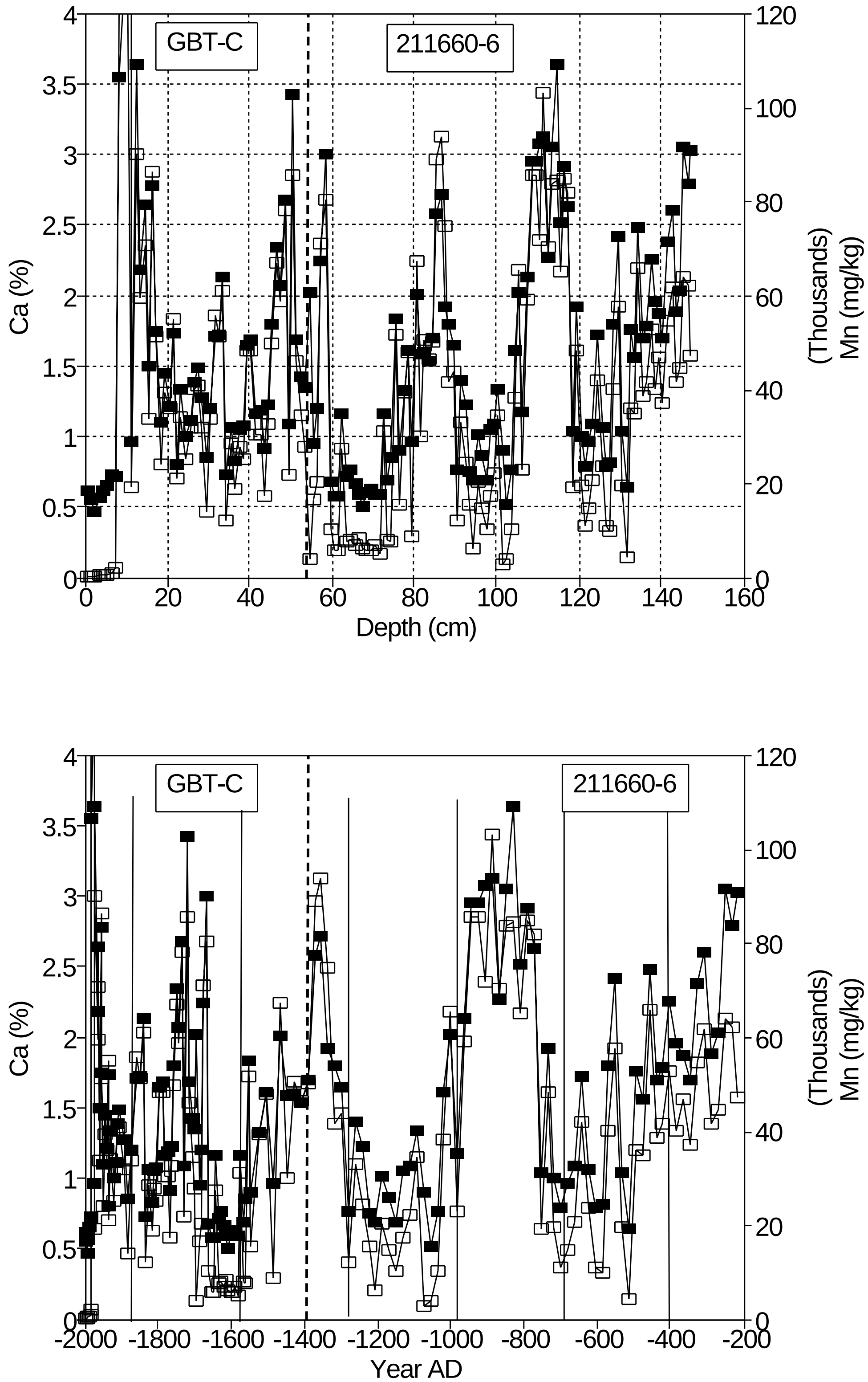


Fig. 28 Ca-Mn vs. depth (upper part) of the uppermost part of the Gotland Basin core, and vs. age (lower part).

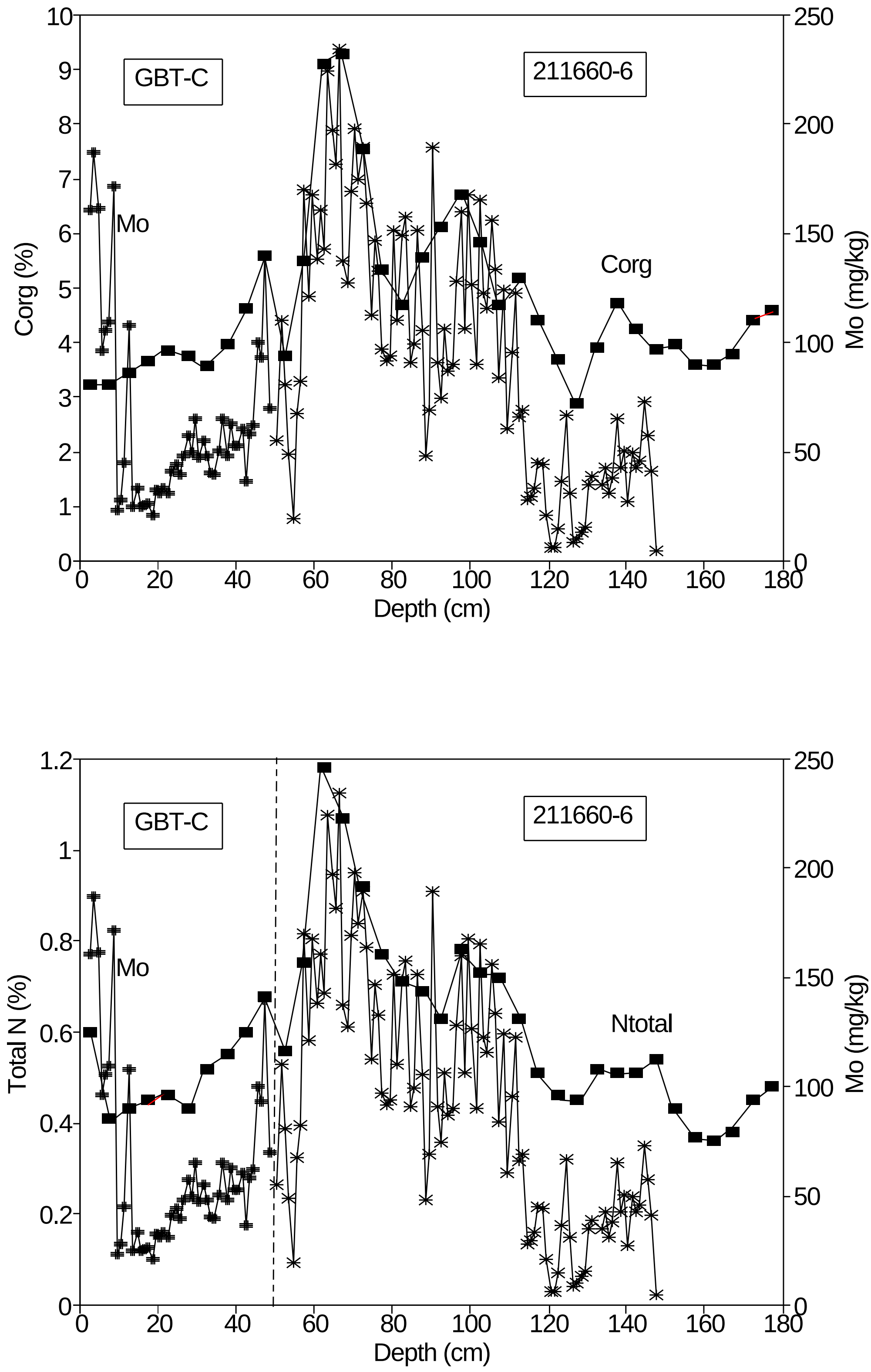


Fig. 29 Distribution of Mo and organic C (upper part of figure) and Mo and total N (lower part) in the upper 1.5 m of the Gotland Basin deep coring site constructed by using the short core GBT-C and the upper 1 m of core 211660-6.

Appendix A1
^{210}Pb and ^{137}Cs activities in Bornholm Basin cores

Gamma Dating Center GDC **SYSTEM3**
Core: B1 **Customer: Larsen GEUS**
Date: 970814

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	199.7	9.4	34.9	17.7	164.8	20.1	159.4	5.4
15	165.5	9.0	27.7	17.0	137.8	19.3	163.6	4.9
25	185.7	8.5	18.8	17.6	166.9	19.5	168.0	4.8
35	228.7	7.8	20.5	16.8	208.2	18.5	179.1	4.6
45	235.9	7.9	26.6	15.6	209.3	17.4	193.5	4.6
55	209.6	8.4	25.0	16.6	184.6	18.6	204.0	4.7
65	198.7	8.3	25.7	16.3	173.0	18.3	184.8	4.7
75	193.4	8.4	23.6	16.7	169.9	18.6	186.5	4.7
85	173.1	8.2	24.0	15.4	149.1	17.5	192.3	4.5
95	220.8	7.5	27.1	14.3	193.7	16.2	164.9	4.5
125	183.6	7.7	26.9	14.4	156.7	16.3	111.1	4.8
155	172.3	7.9	25.4	14.8	146.9	16.8	74.2	5.3
195	138.8	8.3	30.4	14.5	108.4	16.7	34.5	6.4
245	84.1	9.6	36.8	15.1	47.3	17.8	2.4	10.0
295	63.8	10.5	41.1	15.5	22.7	18.7	-3.7	12.2

Gamma Dating Center **SYSTEM 2**
Core: BBT-C **Customer: BASYS**
Date: 971023

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	278.3	11.8	39.8	21.6	238.4	22.5	135.7	5.7
15	374.4	11.2	30.2	22.6	344.1	23.1	177.2	4.9
25	254.3	11.7	35.0	19.4	219.3	20.3	166.9	4.4
35	259.0	10.6	25.3	19.4	233.7	19.7	153.7	3.4
45	230.9	10.7	32.5	17.5	198.4	17.9	135.4	3.7
55	258.5	10.8	30.5	18.5	228.0	18.9	140.8	4.0
65	177.1	10.8	24.2	17.7	152.9	18.1	106.9	3.4
75	205.8	10.5	33.2	16.4	172.6	16.7	131.6	3.0
85	229.8	10.3	31.0	16.7	198.8	16.8	96.8	3.7
95	200.6	10.5	26.4	17.4	174.2	17.7	93.6	3.8
125	241.8	10.2	31.5	16.4	210.3	16.5	53.9	5.6
155	176.1	10.7	32.0	16.2	144.1	16.7	33.2	7.6
195	175.4	10.9	39.6	15.7	135.8	16.3	24.3	9.8
245	169.7	10.8	33.3	16.3	136.5	16.8	18.5	11.4
295	147.6	9.9	36.8	14.8	110.7	14.7	8.1	11.5

Gamma Dating Center GDC **SYSTEM3**
Core: B2 **Customer: Larsen GEUS**
Date: 971023

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
15	251.7	8.2	29.8	19.6	221.8	21.2	112.2	5.4
25	173.4	8.3	40.1	15.7	133.3	17.7	101.5	5.1
35	146.4	8.6	39.3	15.4	107.1	17.6	95.8	5.1
45	163.8	8.2	32.0	16.1	131.8	18.1	85.3	5.1
55	132.6	8.9	33.2	16.5	99.4	18.7	77.4	5.2
65	157.5	8.5	41.6	15.2	115.8	17.4	65.9	5.5
75	135.4	9.2	29.2	17.9	106.2	20.1	67.5	5.7
85	152.8	8.5	30.8	16.5	122.0	18.5	57.9	5.8
95	161.6	8.5	34.9	16.1	126.8	18.2	52.2	6.1
125	213.3	7.9	31.1	16.1	182.2	17.9	34.2	6.9
155	292.8	7.2	30.6	15.3	262.2	16.9	43.9	5.9
195	96.0	9.9	36.8	16.5	59.2	19.2	6.6	10.2
245	120.1	9.1	41.2	15.6	78.9	18.0	8.3	9.4
295	27.6	14.7	39.9	19.5	-12.3	24.4	-22.2	72.7

Gamma Dating Center **SYSTEM 2**
Core: BBTA98 **Customer: BASYS**
Date: 980721

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210usn Bq/kg	s %	Cs-137 Bq/kg	s %
5	264.9	8.2	27.7	18.9	237.2	18.0	147.1	3.4
15	249.8	7.8	28.7	16.3	221.1	15.1	169.5	2.7
25	194.0	8.3	31.1	14.7	162.9	13.6	144.3	2.8
35	208.6	8.1	28.3	15.6	180.3	14.5	131.2	2.9
45	207.7	8.0	34.1	14.2	173.6	12.8	139.1	2.8
55	198.0	8.0	35.4	14.0	162.6	12.6	129.7	2.8
65	173.5	8.4	36.8	13.5	136.7	12.3	111.8	3.1
75	239.6	7.5	31.6	14.6	208.0	13.0	94.2	3.5
85	255.2	7.4	33.4	14.1	221.8	12.4	86.1	3.7
95	233.1	7.7	37.7	13.6	195.5	12.0	79.9	3.9
125	138.5	8.9	37.1	13.5	101.3	12.7	39.6	6.0
155	125.1	9.4	33.8	14.2	91.4	13.7	27.5	7.7
195	121.4	9.7	41.9	13.0	79.5	12.8	13.6	12.3
245	109.9	9.9	36.8	13.9	73.1	13.8	6.9	17.9

Gamma Dating Center GDC **SYSTEM3**
Core: BBT-B **Customer: BASYS**
Date: 980105

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	310.8	8.1	31.2	17.7	279.6	19.5	207.4	5.0
15	258.8	7.6	25.7	15.4	233.1	17.2	175.9	4.7
25	198.7	7.9	23.9	15.3	174.8	17.2	162.4	4.6
35	220.3	7.3	22.5	14.3	197.8	16.1	155.9	4.4
45	226.6	7.4	26.9	14.1	199.7	15.9	180.7	4.4
55	176.2	7.3	22.7	13.7	153.5	15.6	106.8	4.5
65	165.7	7.9	26.7	14.4	139.1	16.5	87.6	5.0
85	168.6	7.7	28.9	14.0	139.7	16.0	89.6	4.9
95	324.1	6.6	28.5	12.8	295.6	14.4	106.4	4.3
125	321.2	7.5	32.0	13.2	289.2	15.2	56.1	6.3
155	105.3	8.5	25.0	14.7	80.4	17.0	8.9	8.8
195	63.9	9.7	24.3	15.2	39.5	18.0	1.9	9.9
245	61.4	9.4	27.3	14.6	34.1	17.4	-1.6	11.5
295	65.9	7.6	27.4	13.0	38.5	15.1	-2.4	7.7

Gamma Dating Center GDC **SYSTEM 3**
Core: BBTB98 **Customer: BASYS**
Date: 980721

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	378.1	6.1	24.7	12.5	353.4	13.9	243.4	3.8
15	213.7	6.9	17.6	14.2	196.1	15.8	206.5	3.9
25	233.4	6.5	28.5	11.2	204.9	12.9	197.9	3.8
35	451.0	5.6	27.6	10.6	423.4	11.9	197.9	3.7
45	255.2	6.3	31.6	10.7	223.6	12.4	177.2	4.0
55	234.4	6.6	20.8	12.9	213.6	14.5	161.8	4.1
65	219.4	6.7	21.4	12.7	197.9	14.4	163.4	4.1
75	192.4	7.1	31.1	11.6	161.4	13.6	172.4	4.0
85	244.1	6.6	32.8	11.2	211.3	13.0	172.1	4.0
95	263.0	5.5	30.3	8.5	232.7	10.1	199.1	3.3
105	346.7	6.1	31.2	11.2	315.5	12.8	210.4	3.9
145	226.6	6.6	28.1	11.3	198.5	13.1	69.8	5.7
195	82.5	9.3	33.3	12.8	49.2	15.8	12.4	18.0
245	101.7	9.0	44.7	11.9	56.9	14.9	0.0	119.0
295	62.1	7.2	32.9	9.7	29.2	12.1	0.0	56.7

Gamma Dating Center GDC **SYSTEM3**
Core: St18023 Customer: Emeis IOW
Date: 970611

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	241.9	6.3	18.1	14.7	223.8	16.0	198.7	5.5
15	206.3	7.6	17.3	15.5	189.0	17.2	161.9	5.6
25	196.8	7.7	13.5	16.2	183.4	17.9	129.7	5.7
35	171.4	7.8	14.9	15.6	156.5	17.5	94.0	5.9
45	203.1	7.6	17.3	15.2	185.7	17.0	93.6	5.9
55	229.6	9.3	11.8	23.5	217.8	25.2	72.2	8.1
65	187.3	8.3	12.4	18.2	174.9	20.0	72.8	6.6
75	188.7	7.7	14.4	15.8	174.3	17.6	65.2	6.3
85	164.7	7.9	11.4	16.6	153.3	18.4	61.8	6.3
95	166.1	8.0	14.9	15.8	151.2	17.7	51.0	6.7
125	163.2	8.3	17.2	16.1	146.0	18.1	42.5	7.1
155	142.8	8.2	12.9	16.4	129.9	18.3	27.4	7.4
195	61.2	10.4	19.6	16.2	41.5	19.2	6.7	9.5
245	45.7	11.7	15.1	17.9	30.6	21.4	0.0	12.0
305	67.0	7.8	12.7	13.9	54.3	15.9	12.9	6.4

Appendix A2
CRS modelling Bornholm Basin

Core: B1 SYSTEM3
Date: 971104 Core take: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.7	1.50	2950.5
1	2	1.5	1995.9	1.17	3437.0
2	3	2.5	1994.9	0.85	2737.7
3	4	3.5	1993.5	0.65	2094.3
4	5	4.5	1991.9	0.59	1978.7
5	6	5.5	1990.2	0.58	2128.2
6	7	6.5	1988.4	0.52	2142.9
7	8	7.5	1986.3	0.47	2045.3
8	9	8.5	1984.3	0.52	2199.7
9	10	9.5	1981.8	0.33	1548.0
10	11	10.5	1979.1	0.40	1675.9
11	12	11.5	1976.6	0.40	1855.3
12	13	12.5	1973.7	0.31	1494.0
13	14	13.5	1970.3	0.28	1378.6
14	15	14.5	1966.7	0.27	1259.8
15	16	15.5	1962.5	0.22	1126.6
16	17	16.5	1957.8	0.20	1055.4
17	18	17.5	1952.7	0.19	979.4
18	19	18.5	1947.3	0.18	904.8
19	20	19.5	1941.3	0.16	808.9
20	21	20.5	1934.5	0.14	744.9
21	22	21.5	1926.8	0.12	678.9
22	23	22.5	1918.1	0.11	615.2
23	24	23.5	1908.4	0.10	560.6
24	25	24.5	1897.9	0.09	532.2
25	26	25.5	1885.4	0.07	415.3
26	27	26.5	1867.8	0.05	286.0
27	28	27.5	1839.8	0.03	157.6

Core: B2 SYSTEM2
Date: 91124 Core take: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.7	1.50	2950.5
1	2	1.5	1995.9	1.17	3437.0
2	3	2.5	1994.9	0.85	2737.7
3	4	3.5	1993.5	0.65	2094.3
4	5	4.5	1991.9	0.59	1978.7
5	6	5.5	1990.2	0.58	2128.2
6	7	6.5	1988.4	0.52	2142.9
7	8	7.5	1986.3	0.47	2045.3
8	9	8.5	1984.3	0.52	2199.7
9	10	9.5	1981.8	0.33	1548.0
10	11	10.5	1979.1	0.40	1675.9
11	12	11.5	1976.6	0.40	1855.3
12	13	12.5	1973.7	0.31	1494.0
13	14	13.5	1970.3	0.28	1378.6
14	15	14.5	1966.7	0.27	1259.8
15	16	15.5	1962.5	0.22	1126.6
16	17	16.5	1957.8	0.20	1055.4
17	18	17.5	1952.7	0.19	979.4
18	19	18.5	1947.3	0.18	904.8
19	20	19.5	1941.3	0.16	808.9
20	21	20.5	1934.5	0.14	744.9
21	22	21.5	1926.8	0.12	678.9
22	23	22.5	1918.1	0.11	615.2

Core: B2 (continued) SYSTEM2

23	24	23.5	1908.4	0.10	560.6
24	25	24.5	1897.9	0.09	532.2
25	26	25.5	1885.4	0.07	415.3
26	27	26.5	1867.8	0.05	286.0
27	28	27.5	1839.8	0.03	157.6

Core: BBT-B SYSTEM3
Date: 980107 Core take: 1997

Data used: down to 22 cm Core take: 1997
exclusion and interpolation

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.4	0.80	719.5
1	2	1.5	1994.8	0.50	812.4
2	3	2.5	1992.9	0.57	1027.5
3	4	3.5	1990.5	0.34	832.4
4	5	4.5	1987.6	0.34	755.6
5	6	5.5	1984.3	0.27	881.1
6	7	6.5	1981.1	0.38	899.5
7	8	7.5	1978.3	0.32	820.8
8	9	8.5	1975.1	0.31	741.7
9	10	9.5	1970.2	0.15	290.1
10	11	10.5	1964.0	0.18	260.6
11	12	11.5	1958.0	0.16	217.5
12	13	12.5	1951.1	0.13	170.7
13	14	13.5	1942.4	0.10	189.3
14	15	14.5	1931.5	0.08	196.6
15	16	15.5	1920.5	0.10	260.7
16	17	16.5	1910.1	0.09	224.9
17	18	17.5	1897.2	0.07	178.3
18	19	18.5	1878.4	0.04	125.9
19	20	19.5	1850.7	0.03	78.7

Core: BBT-C SYSTEM3
Date: 980107 Core take: 1997

Data used: down to 22 cm
exclusion and interpolation

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.7	1.85	1665.1
1	2	1.5	1996.1	1.45	1129.4
2	3	2.5	1995.5	1.82	1742.3
3	4	3.5	1994.7	1.00	1585.7
4	5	4.5	1993.7	1.04	1813.8
5	6	5.5	1992.8	1.09	1534.3
6	7	6.5	1991.8	0.87	2209.0
7	8	7.5	1990.5	0.75	1879.1
8	9	8.5	1989.1	0.62	1553.0
9	10	9.5	1987.5	0.63	1689.0
10	11	10.5	1986.1	0.83	1575.1
11	12	11.5	1984.5	0.55	1341.0
12	13	12.5	1982.6	0.51	1202.3
13	14	13.5	1980.7	0.51	1253.8
14	15	14.5	1978.7	0.51	1319.9
15	16	15.5	1976.7	0.49	1463.6
16	17	16.5	1974.7	0.52	1422.0
17	18	17.5	1972.7	0.49	1356.4
18	19	18.5	1970.7	0.52	1297.9
19	20	19.5	1968.6	0.43	1211.1

Core: BBT-C (continued) **SYSTEM3**

Data used: down to 30cm Core take: 1998

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
20	21	20.5	1966.2	0.42	1126.3
21	22	21.5	1963.7	0.38	1041.0
22	23	22.5	1960.9	0.33	959.3
23	24	23.5	1957.9	0.32	867.7
24	25	24.5	1954.6	0.29	780.2
25	26	25.5	1951.0	0.27	734.0
26	27	26.5	1946.9	0.23	672.4
27	28	27.5	1942.5	0.22	614.9
28	29	28.5	1937.3	0.16	539.8
29	30	29.5	1931.1	0.16	470.3
30	31	30.5	1924.6	0.15	429.5
31	32	31.5	1917.3	0.13	383.0
32	33	32.5	1908.9	0.11	337.5
33	34	33.5	1899.3	0.10	292.3
34	35	34.5	1887.8	0.08	244.4
35	36	35.5	1873.6	0.06	196.8
36	37	36.5	1855.4	0.05	149.5
37	38	37.5	1829.0	0.03	99.6

Core: BBTA-98 **SYSTEM2**
Date: 990129 Core take: 1998

Data used: down to 30cm Core take: 1998

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1997.5	1.02	1126.9
1	2	1.5	1996.3	0.70	1157.3
2	3	2.5	1994.9	0.73	1506.3
3	4	3.5	1993.4	0.58	1291.6
4	5	4.5	1991.6	0.55	1269.7
5	6	5.5	1989.8	0.56	1284.0
6	7	6.5	1988.0	0.58	1449.0
7	8	7.5	1985.8	0.36	876.7
8	9	8.5	1982.6	0.29	741.6
9	10	9.5	1979.2	0.30	762.3
10	11	10.5	1975.8	0.29	816.1
11	12	11.5	1972.5	0.31	907.5
12	13	12.5	1969.6	0.37	1115.5
13	14	13.5	1966.8	0.34	1036.0
14	15	14.5	1963.8	0.33	997.4
15	16	15.5	1960.7	0.30	939.9
16	17	16.5	1957.3	0.29	861.9
17	18	17.5	1953.8	0.29	823.1
18	19	18.5	1950.2	0.27	783.6
19	20	19.5	1946.2	0.23	693.6
20	21	20.5	1941.4	0.20	634.9
21	22	21.5	1936.1	0.18	549.3
22	23	22.5	1929.9	0.14	451.9
23	24	23.5	1922.4	0.12	366.1
24	25	24.5	1911.8	0.08	259.2
25	26	25.5	1897.4	0.06	212.7
26	27	26.5	1878.6	0.05	151.0
27	28	27.5	1846.1	0.02	80.9

Core: BBTB-98 **SYSTEM3**
Date: 990129 Core take: 1998

Data used: down to 35cm

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1997.2	0.61	1003.5
1	2	1.5	1995.7	0.83	1742.7
2	3	2.5	1994.4	0.68	1595.2
3	4	3.5	1992.0	0.30	699.4
4	5	4.5	1989.4	0.54	1251.5
5	6	5.5	1987.5	0.51	1234.7
6	7	6.5	1985.5	0.49	1252.9
7	8	7.5	1983.6	0.58	1458.3
8	9	8.5	1981.5	0.40	1034.1
9	10	9.5	1978.8	0.34	859.8
10	11	10.5	1975.6	0.28	721.4
11	12	11.5	1971.7	0.24	570.5
12	13	12.5	1967.6	0.25	449.2
13	14	13.5	1963.0	0.19	435.8
14	15	14.5	1957.6	0.18	415.6
15	16	15.5	1952.1	0.19	448.2
16	17	16.5	1946.9	0.20	513.4
17	18	17.5	1942.2	0.23	677.9
18	19	18.5	1938.0	0.25	752.3
19	20	19.5	1934.7	0.39	1133.7
20	21	20.5	1931.8	0.30	1011.9
21	22	21.5	1928.4	0.28	910.9
22	23	22.5	1924.4	0.23	802.3
23	24	23.5	1919.8	0.20	695.8
24	25	24.5	1914.1	0.16	509.3
25	26	25.5	1907.4	0.14	475.6
26	27	26.5	1900.0	0.13	425.9
27	28	27.5	1891.8	0.11	376.1
28	29	28.5	1881.5	0.09	315.5
29	30	29.5	1869.8	0.09	277.0
30	31	30.5	1856.6	0.07	221.8
31	32	31.5	1839.3	0.05	171.3

Appendix A3
^{210}Pb and ^{137}Cs activities in Gotland Basin cores

Gamma Dating Center GDC SYSTEM3
Core: GBT-C Customer: BASYS
Date: 971024

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	920.8	9.0	60.0	26.3	860.8	27.8	446.1	5.8
15	788.1	7.9	0.0	68.1	795.6	68.6	418.0	5.0
25	604.8	9.0	43.6	24.4	561.2	26.0	332.1	5.7
35	898.0	7.6	55.0	19.0	843.0	20.5	354.4	5.1
45	1101.5	7.7	29.1	29.6	1072.5	30.6	500.3	5.1
55	999.9	7.4	57.7	18.5	942.2	19.9	354.0	5.1
65	994.8	7.1	76.5	15.6	918.3	17.1	190.4	5.6
75	830.3	7.8	95.4	16.4	734.9	18.1	144.1	6.8
85	704.7	7.3	214.8	13.1	490.0	15.0	85.8	6.7
95	1186.9	6.5	251.0	12.0	936.0	13.7	87.6	4.8
125	266.7	7.5	62.8	13.4	203.9	15.4	18.3	8.1
155	243.7	7.7	86.0	13.3	157.7	15.4	6.2	10.1
195	153.2	8.0	73.1	13.3	80.1	15.5	0.6	10.4
245	135.6	8.0	76.2	13.2	59.3	15.4	0.0	
295	124.8	8.1	79.8	13.2	45.0	15.5	0.0	

Gamma Dating Center SYSTEM 2
Core: GOBEX-303 Customer: Emeis IOW
Date: 961129

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	673.8	9.8	76.5	15.8	597.3	15.7	276.6	2.9
15	794.0	9.8	64.3	16.3	729.7	16.2	231.5	3.4
25	655.5	9.7	54.4	16.0	601.1	15.8	213.5	3.1
35	496.2	9.7	56.7	15.5	439.5	15.3	118.1	3.9
45	455.6	9.7	55.7	15.2	399.9	15.0	91.1	4.0
55	334.6	9.7	53.4	15.0	281.2	14.8	56.7	4.6
65	308.3	9.6	51.7	14.8	256.6	14.5	37.3	5.3
75	229.6	9.8	52.9	14.7	176.7	14.6	16.8	8.5
85	183.5	10.3	53.3	14.9	130.2	15.0	12.9	10.7
95	198.4	12.7	65.4	16.3	133.0	18.1	8.6	29.2
125	139.2	10.7	68.8	14.5	70.3	15.0	0.0	
155	121.7	13.5	68.1	15.1	53.5	17.6	0.0	
205	101.5	10.4	68.5	14.4	33.0	14.6	0.0	
255	128.6	11.2	75.6	14.6	53.0	15.4	0.0	
305	118.8	9.8	92.4	14.3	26.4	14.1	0.0	

Gamma Dating Center SYSTEM 2
Core: Gobex-301 Customer: Emeis IOW
Date: 961125

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	369.8	8.0	42.8	14.9	327.0	13.6	74.2	5.4
15	332.5	7.8	51.7	14.1	280.8	12.7	52.7	5.7
25	229.9	8.3	58.8	14.0	171.0	12.8	71.7	4.7
35	209.9	8.1	56.7	13.8	153.2	12.5	19.3	8.2
45	156.1	8.5	56.6	13.8	99.6	12.8	11.5	10.4
55	137.0	8.9	55.0	13.9	82.0	13.1	6.2	15.5
75	121.4	9.2	57.2	13.8	64.2	13.2	3.2	22.1
85	118.3	9.4	60.4	13.8	57.9	13.3	2.9	22.5
95	121.8	9.2	66.3	13.7	55.5	13.1	0.0	
125	110.7	9.6	70.1	13.7	40.5	13.4	0.0	
155	104.0	9.7	69.1	13.7	34.9	13.5	0.0	
205	88.2	10.5	70.7	13.6	17.5	14.0	0.0	
255	95.4	10.1	68.9	13.7	26.5	13.7	0.0	
305	100.9	9.8	59.1	13.8	41.8	13.7	0.0	

Gamma Dating Center GDC SYSTEM3
Core: GOBEX-302 Customer: Emeis IOW
Date: 961121

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	520.9	9.2	69.1	15.0	451.9	17.5	93.7	5.4
15	425.6	10.0	61.2	16.3	364.4	19.1	79.0	7.4
25	346.3	9.3	53.1	14.7	293.2	17.4	50.5	6.1
35	320.1	10.0	49.7	16.2	270.3	19.0	29.1	10.1
45	224.1	9.8	50.8	14.9	173.3	17.8	10.4	10.0
55	169.2	11.3	42.7	16.8	126.5	20.3	10.3	13.3
65	161.2	9.8	40.3	14.9	120.9	17.8	3.4	11.2
75	154.5	11.4	54.8	16.4	99.7	20.0	6.1	13.6
85	148.7	9.9	45.6	14.7	103.1	17.7	2.0	11.3
125	109.2	12.9	50.7	17.6	58.5	21.8	0.8	18.4
155	91.9	11.2	57.7	15.6	34.3	19.2	0.0	
195	94.9	10.2	52.9	14.7	42.0	17.9	0.7	10.3
245	108.4	10.1	64.9	14.6	43.5	17.7	0.0	
295	100.6	10.3	60.2	14.7	40.5	17.9	0.0	
345	120.4	9.8	67.9	14.3	52.5	17.4	0.0	
425	123.4	14.5	78.8	18.7	44.6	23.7	0.0	

Appendix A4
CRS modelling of Gotland Basin cores

Core: GBT-C BASYS SYSTEM3
Date: 980206 coretake: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.6	1.19	317.9
1	2	1.5	1995.4	0.66	328.4
2	3	2.5	1994.2	1.10	452.7
3	4	3.5	1992.8	0.54	284.8
4	5	4.5	1990.9	0.51	211.0
5	6	5.5	1988.7	0.42	223.6
6	7	6.5	1986.0	0.33	209.8
7	8	7.5	1983.6	0.54	247.9
8	9	8.5	1981.3	0.38	280.4
9	10	9.5	1978.4	0.31	306.0
10	11	10.5	1975.4	0.35	351.2
11	12	11.5	1972.9	0.48	439.9
12	13	12.5	1970.5	0.35	594.5
13	14	13.5	1967.1	0.26	585.4
14	15	14.5	1963.3	0.26	568.1
15	16	15.5	1959.7	0.31	556.1
16	17	16.5	1956.0	0.24	597.6
17	18	17.5	1951.8	0.24	625.3
18	19	18.5	1947.9	0.27	685.9
19	20	19.5	1944.4	0.29	695.7
20	21	20.5	1940.8	0.27	665.7
21	22	21.5	1936.8	0.24	630.1
22	23	22.5	1932.6	0.24	601.1
23	24	23.5	1928.2	0.21	567.5
24	25	24.5	1923.1	0.18	491.0
25	26	25.5	1917.2	0.16	442.2
26	27	26.5	1910.4	0.14	397.6
27	28	27.5	1903.4	0.14	363.3
28	29	28.5	1894.7	0.10	308.9
29	30	29.5	1883.4	0.08	232.7
30	31	30.5	1872.0	0.09	224.3
31	32	31.5	1859.7	0.07	187.4
32	33	32.5	1841.9	0.05	140.0
33	34	33.5	1817.1	0.04	99.9

Core: GOBEX301 IOW SYSTEM2
Date: 961125 coretake: 1996

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1994.2	0.28	292.9
1	2	1.5	1990.2	0.22	298.4
2	3	2.5	1986.0	0.26	438.3
3	4	3.5	1981.7	0.21	426.9
4	5	4.5	1977.4	0.25	583.8
5	6	5.5	1973.3	0.24	627.9
6	7	6.5	1969.4	0.28	661.7
7	8	7.5	1965.9	0.30	652.6
8	9	8.5	1962.3	0.26	645.2
9	10	9.5	1958.4	0.26	599.9
10	11	10.5	1954.1	0.21	580.6
11	12	11.5	1949.0	0.19	552.9
12	13	12.5	1943.5	0.18	522.8
13	14	13.5	1937.8	0.17	470.3
14	15	14.5	1931.8	0.17	406.4
15	16	15.5	1924.2	0.11	335.9
16	17	16.5	1913.9	0.09	278.2
17	18	17.5	1900.2	0.06	206.5
18	19	18.5	1879.3	0.04	133.1
19	20	19.5	1851.4	0.03	82.8

Core: GOBEX302 IOW SYSTEM3

Date: 961121 coretake: 1996

Data used: upper 100

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/cm^2/a$)
0	1	0.5	1994.3	0.30	215.1
1	2	1.5	1990.0	0.19	228.7
2	3	2.5	1984.8	0.19	244.7
3	4	3.5	1979.0	0.16	221.5
4	5	4.5	1973.3	0.20	298.2
5	6	5.5	1968.0	0.19	350.0
6	7	6.5	1961.8	0.14	299.8
7	8	7.5	1954.7	0.14	298.2
8	9	8.5	1946.1	0.10	218.6
9	10	9.5	1933.7	0.07	169.0
10	11	10.5	1915.5	0.05	113.8
11	12	11.5	1883.6	0.02	57.3

Core: GOBEX303 IOW SYSTEM2
Date 961129 coretake: 1996

Data used: upper 150

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/cm^2/a$)
0	1	0.5	1994.6	0.36	240.1
1	2	1.5	1991.5	0.29	177.2
2	3	2.5	1987.9	0.27	192.7
3	4	3.5	1984.1	0.26	235.0
4	5	4.5	1979.8	0.21	225.5
5	6	5.5	1975.1	0.22	280.2
6	7	6.5	1969.8	0.17	258.5
7	8	7.5	1963.7	0.16	315.0
8	9	8.5	1957.7	0.17	362.4
9	10	9.5	1951.4	0.15	338.4
10	11	10.5	1943.9	0.12	310.1
11	12	11.5	1934.4	0.09	272.0
12	13	12.5	1923.5	0.09	246.0
13	14	13.5	1907.7	0.05	156.6
14	15	14.5	1878.6	0.03	80.9

Appendix A5

^{210}Pb and ^{137}Cs activities in North Central Basin cores

Gamma Dating Center GDC SYSTEM3
Core: NCBT-A Customer: BASYS
Date: 971024

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	506.7	9.1	46.6	22.0	460.1	23.8	513.9	4.9
15	721.7	7.7	50.8	19.0	670.9	20.5	771.6	4.4
25	763.3	7.2	41.5	17.9	721.7	19.3	481.1	4.5
35	732.1	7.3	58.7	15.9	673.3	17.4	213.9	5.4
45	433.9	7.2	43.1	14.4	390.8	16.1	125.6	5.1
55	180.5	7.9	51.7	13.5	128.8	15.6	78.8	5.2
65	130.1	7.9	43.8	13.4	86.3	15.6	40.3	5.5
75	106.3	8.3	43.4	13.6	62.9	16.0	14.5	7.5
85	90.2	8.6	42.3	13.8	47.8	16.3	8.0	8.6
95	82.6	8.8	44.2	13.9	38.4	16.5	8.5	8.2
125	62.9	9.5	42.7	14.4	20.2	17.2	0.0	
155	58.9	9.7	41.5	14.6	17.4	17.5	0.0	
195	45.6	11.0	49.3	15.4	0.0	18.9	0.0	
235	56.8	10.0	42.2	14.7	14.7	17.7	0.0	
273	43.0	8.1	39.0	13.1	4.0	15.5	0.0	

Gamma Dating Center SYSTEM 2
Core: NCBT-B Customer: BASYS
Date: 980130

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	714.9	12.1	93.9	23.1	621.0	24.1	483.8	4.6
15	666.7	11.4	37.3	26.1	629.5	26.7	686.5	3.1
25	732.4	10.2	33.6	23.6	698.8	23.7	369.6	3.3
35	762.1	10.3	38.6	23.2	723.5	23.3	191.3	5.8
45	634.1	9.5	73.6	15.1	560.6	14.8	148.1	3.5
55	361.6	10.7	54.1	16.8	307.5	17.2	89.7	6.3
65	199.1	11.1	58.2	15.4	140.9	16.1	49.4	7.3
75	178.8	10.6	57.3	14.9	121.5	15.3	25.6	8.8
85	139.9	10.7	50.7	14.8	89.2	15.3	14.1	10.9
95	119.8	9.8	47.8	14.4	72.0	14.3	4.2	14.2
125	92.1	12.0	49.2	14.8	42.9	16.2	0.0	
155	60.3	14.0	43.7	15.0	16.6	17.9	0.0	
195	89.4	11.9	46.9	14.8	42.5	16.2	0.0	
245	79.7	12.5	50.6	10.0	29.1	12.5	0.0	
295	66.4	13.3	48.4	14.8	18.0	17.2	0.0	

Gamma Dating Center GDC SYSTEM3
Core: NCBT-C Customer: BASYS
Date: 980202

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	608.0	7.4	44.8	16.7	563.3	18.3	557.1	4.3
15	826.9	7.2	37.6	18.9	789.2	20.3	722.9	4.3
25	894.6	7.1	59.0	15.7	835.6	17.3	648.0	4.3
35	888.1	7.0	51.5	16.5	836.7	17.9	664.9	4.3
45	617.8	7.0	57.3	14.2	560.5	15.9	189.0	4.9
55	776.7	7.1	48.8	15.9	727.9	17.4	189.3	5.2
65	653.6	7.2	58.9	14.7	594.6	16.4	173.3	5.2
75	646.4	7.4	81.7	14.3	564.7	16.1	160.6	5.5
85	499.5	6.7	65.5	12.8	433.9	14.5	100.2	4.7
95	371.2	7.3	53.4	14.1	317.7	15.9	27.1	7.4
125	165.4	6.8	55.8	12.3	109.6	14.0	4.9	6.5
155	102.9	8.5	54.0	13.6	49.0	16.0	3.1	9.9
195	90.5	8.7	44.3	13.8	46.2	16.3	0.0	
245	70.4	9.3	41.1	14.3	29.3	17.1	0.0	
295	58.3	8.3	36.7	13.4	21.6	15.8	0.0	

Gamma Dating Center SYSTEM 2
Core: NCBT-D Customer: BASYS
Date: 971021

Depth mm	Pb-210tot Bq/kg	s %	Pb-210sup Bq/kg	s %	Pb-210uns Bq/kg	s %	Cs-137 Bq/kg	s %
5	653.4	11.2	15.4	49.8	638.0	50.0	450.0	3.6
15	662.6	10.6	42.1	22.0	620.6	22.2	413.0	3.3
25	659.1	10.6	41.4	22.0	617.7	22.3	347.8	3.7
35	842.2	10.0	46.5	20.5	795.8	20.5	433.9	3.0
45	771.0	9.8	54.5	17.7	716.4	17.6	172.7	4.3
55	499.0	10.3	44.4	18.6	454.7	18.7	85.0	7.1
65	627.0	9.9	56.2	17.0	570.8	16.9	133.6	5.0
75	531.3	9.4	34.0	16.1	497.3	15.7	67.4	4.5
85	727.9	10.0	71.5	17.2	656.4	17.2	86.7	8.3
95	716.9	9.8	57.4	17.2	659.5	17.0	99.4	6.1
105	682.8	9.8	51.1	17.9	631.6	17.8	118.9	5.5
115	572.1	10.0	74.4	16.0	497.6	16.0	81.0	7.0
125	436.3	9.8	66.7	16.2	369.6	16.0	38.2	11.4
155	194.6	10.2	77.7	14.6	116.9	14.7	3.3	28.7
175	172.4	10.2	66.1	14.7	106.3	14.8	0.0	
195	122.8	9.8	58.8	14.3	63.9	14.2	0.0	
230	107.6	11.3	55.3	14.8	52.2	15.7	0.0	
250	114.8	11.0	49.6	14.9	65.2	15.6	0.0	
300	91.1	12.0	42.8	15.2	48.3	16.5	0.0	
340	83.2	12.2	43.1	15.2	40.0	16.7	0.0	

Appendix A6
CRS modelling North Central Basin

Core: NCBT-A SYSTEM3
Date: 980207 Coretake: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.2	0.63	252.7
1	2	1.5	1993.7	0.30	156.9
2	3	2.5	1989.2	0.17	123.7
3	4	3.5	1983.3	0.17	111.6
4	5	4.5	1975.7	0.11	149.9
5	6	5.5	1968.4	0.18	388.3
6	7	6.5	1962.7	0.17	489.0
7	8	7.5	1956.2	0.14	550.7
8	9	8.5	1949.3	0.15	597.8
9	10	9.5	1942.7	0.16	620.4
10	11	10.5	1935.4	0.12	594.1
11	12	11.5	1927.0	0.11	573.6
12	13	12.5	1918.9	0.14	601.5
13	14	13.5	1909.8	0.09	476.7
14	15	14.5	1897.3	0.07	351.1
15	16	15.5	1878.5	0.04	209.1
16	17	16.5	1848.5	0.03	131.2

Core: NCBT-B SYSTEM3
Date: 980207 Coretake: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.3	0.74	195.5
1	2	1.5	1994.6	0.48	181.0
2	3	2.5	1991.4	0.23	143.9
3	4	3.5	1987.1	0.23	122.4
4	5	4.5	1982.6	0.21	137.8
5	6	5.5	1978.0	0.23	221.3
6	7	6.5	1973.9	0.25	429.1
7	8	7.5	1969.0	0.17	421.7
8	9	8.5	1961.6	0.11	448.6
9	10	9.5	1952.0	0.10	422.2
10	11	10.5	1941.0	0.08	369.9
11	12	11.5	1928.5	0.08	314.9
12	13	12.5	1912.9	0.06	235.8
13	14	13.5	1889.4	0.03	151.6
14	15	14.5	1850.8	0.02	84.9

Core: NCBT-C SYSTEM3
Date: 980207 Coretake: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1995.9	0.46	395.6
1	2	1.5	1993.5	0.38	260.9
2	3	2.5	1990.5	0.30	223.3
3	4	3.5	1987.1	0.28	200.5
4	5	4.5	1983.3	0.25	266.1
5	6	5.5	1979.0	0.22	179.4
6	7	6.5	1974.0	0.19	188.5
7	8	7.5	1969.2	0.23	174.5
8	9	8.5	1964.7	0.22	198.7
9	10	9.5	1959.4	0.17	228.9
10	11	10.5	1951.5	0.10	231.8

Core: NCBT-C (continued) SYSTEM3
Date: 980207 Coretake: 1997

Data used: all

Depth Top (cm)	Depth Bottom (cm)	Slice Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
11	12	11.5	1939.1	0.07	223.6
12	13	12.5	1925.2	0.08	247.2
13	14	13.5	1909.1	0.05	187.9
14	15	14.5	1876.8	0.02	100.5

Core: NCBT-D SYSTEM2
Date: 980207 Coretake: 1997

Data usedall

Top (cm)	Bottom (cm)	Depth (cm)	Year (CRS-AP)	Sed.rate (cm/a)	Accu.rate ($g/m^2/a$)
0	1	0.5	1996.5	0.91	459.4
1	2	1.5	1995.2	0.72	452.9
2	3	2.5	1993.8	0.70	435.7
3	4	3.5	1991.9	0.43	315.5
4	5	4.5	1989.2	0.32	319.3
5	6	5.5	1986.6	0.49	472.9
6	7	6.5	1983.7	0.26	337.0
7	8	7.5	1980.2	0.30	350.6
8	9	8.5	1976.7	0.28	239.4
9	10	9.5	1972.1	0.18	202.4
10	11	10.5	1966.8	0.20	206.3
11	12	11.5	1962.0	0.21	219.2
12	13	12.5	1957.2	0.21	237.4
13	14	13.5	1952.4	0.21	293.0
14	15	14.5	1943.0	0.07	295.5
15	16	15.5	1931.3	0.10	350.2
16	17	16.5	1919.7	0.07	288.2
17	18	17.5	1904.4	0.06	220.9
18	19	18.5	1878.6	0.03	129.7

Appendix B1

EDX Results of Bornholm Basin cores (calibrated against intern. geological reference materials)

Core: B1

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
B1	1.5	2.78	0.55	3534	2102	4.57	119	94	23	59	56	230	18		392	147	124	37	134	20	6
B1	2.5	2.76	0.55	3441	2513	4.55	110	130	24	59	56	232	18	8	389	160	127	31	133	14	11
B1	3.5	2.94	0.57	3603	4433	4.70	91	86	25	50	54	224	17	10	390	149	126	34	127	15	7
B1	4.5	2.83	0.60	3471	5855	4.92	128	117	23	59	57	233	18	0	415	145	129	30	126	15	13
B1	5.5	2.85	0.53	3539	1790	4.55	103	87	22	65	61	238	19	5	376	132	123	39	125	11	4
B1	6.5	2.96	0.55	3778	1079	4.53	133	139	21	55	58	245	19	18	352	133	107	35	127	11	8
B1	7.5	2.90	0.56	3807	2173	4.67	82	92	18	60	56	233	18		337	134	113	41	139	18	5
B1	8.5	3.07	0.58	3762	2100	5.29	94	106	29	60	55	235	19	15	340	126	115	40	124	15	2
B1	9.5	3.06	0.55	3771	2095	5.25	78	93	24	59	62	250	16		320	128	106	30	125	18	9
B1	10.5	2.61	0.53	3480	1622	4.78	105	114	28	60	64	245	18	5	337	142	131	42	127	14	13
B1	11.5	3.01	0.53	3829	1155	4.90	110	98	21	56	54	243	18	6	315	134	104	38	137	19	9
B1	12.5	2.99	0.56	3714	1323	5.57	104	83	25	52	58	253	16		307	143	119	35	136	14	4
B1	13.5	2.87	0.57	3602	1402	5.21	94	110	27	56	66	262	18	13	305	141	120	44	141	19	1
B1	14.5	2.86	0.57	3396	1415	5.40	140	154	26	62	75	306	15		314	129	106	31	126	13	11
B1	15.5	3.08	0.53	3688	1311	5.02	80	84	26	63	65	245	20		297	134	111	44	135	13	3
B1	16.5	2.93	0.54	3727	1233	4.62	109	100	23	52	58	236	19		293	154	125	42	145	13	4
B1	17.5	2.91	0.55	3609	1741	4.85	67	114	25	50	58	229	19	0	291	152	118	46	142	23	
B1	18.5	2.91	0.53	3589	2588	5.16	100	50	27	53	46	209	16		279	142	117	44	144	16	
B1	19.5	3.21	0.63	3976	2764	5.62	135	63	25	50	55	219	18		287	149	119	39	134	12	7
B1	20.5	2.94	0.60	3718	3257	5.52	109	100	24	50	45	185	17		265	148	129	41	136	15	1
B1	21.5	3.11	0.58	3893	2829	5.44	90	131	24	54	41	156	20	0	262	126	108	37	136	17	7
B1	22.5	3.14	0.61	3787	3977	5.27	71	90	24	47	39	152	18	8	267	142	120	41	137	15	6
B1	23.5	3.40	0.64	4169	4560	5.77	83	113	27	50	41	151	18		272	135	111	36	140	15	3
B1	24.5	3.00	0.66	3887	6245	5.50	84	103	23	53	37	142	19	18	258	140	117	32	132	6	4
B1	29.5	3.12	0.60	4067	1813	4.92	132	132	25	62	46	133	19	5	295	141	110	35	135	13	5
B1	34.5	3.27	0.59	4148	2376	5.69	110	107	28	56	48	127	20	22	277	144	120	38	131	9	8
B1	39.5	3.08	0.75	3507	12327	5.60	126	88	23	45	38	113	17	7	251	127	121	36	126	11	2

Core: B2

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
B2	0.5	2.10	0.58	2245	7069	4.55	41	93	26	47	46	187	15	29	517	123	141	21	82	2	17
B2	1.5	2.40	0.63	2720	2667	4.81	75	80	27	50	51	201	15		464	137	127	20	96	8	16
B2	2.5	2.83	0.60	3238	3143	5.37	83	54	30	55	53	206	18		384	131	123	40	119	13	2
B2	3.5	2.64	0.60	3230	4781	5.00	90	64	26	48	47	193	16		347	132	119	27	103	10	1
B2	4.5	2.50	0.61	3127	5901	4.89	44	66	20	51	50	188	15	5	329	125	121	34	119	12	0
B2	5.5	2.79	0.58	3352	2620	4.71	92	77	22	50	52	202	17		334	126	112	30	114	14	3

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
B2	6.5	2.69	0.56	3391	1699	4.57	97	72	23	55	49	228	19	20	341	135	110	38	116	14	7
B2	7.5	2.73	0.60	3346	3036	4.86	72	45	22	57	54	214	18	5	320	127	126	40	132	16	6
B2	8.5	2.83	0.59	3534	3887	5.08	94	80	26	52	56	229	17		302	132	110	30	120	15	1
B2	9.5	2.88	0.61	3623	4016	5.11	64	68	27	57	53	232	19	25	307	141	118	32	128	15	5
B2	10.5	2.77	0.54	3326	2222	4.89	74	93	25	52	55	247	16	7	321	129	125	43	129	13	6
B2	11.5	2.57	0.56	3356	2590	4.77	118	78	24	61	54	251	14		314	137	107	29	116	17	6
B2	12.5	2.77	0.62	3386	7084	5.68	82	56	29	52	58	258	15		318	124	117	34	114	15	12
B2	13.5	2.43	0.55	2904	1972	5.41	77	64	27	50	68	313	12	1	305	116	98	24	100	15	18
B2	14.5	2.67	0.56	3486	1706	5.13	82	119	22	51	61	291	13		300	119	110	38	108	15	12
B2	15.5	2.39	0.56	3029	1927	4.63	52	53	26	75	96	396	15	7	326	116	106	29	109	16	27
B2	16.5	2.45	0.55	2946	6433	5.28	62	118	21	62	72	291	16		286	131	117	27	102	15	21
B2	17.5	2.78	0.62	3331	4807	4.94	85	70	23	55	52	213	17		286	123	110	36	123	16	6
B2	18.5	2.72	0.62	3513	5753	4.94	79	107	26	54	49	204	18		290	129	116	36	126	16	1
B2	19.5	2.75	0.61	3487	5735	5.05	75	102	23	55	45	200	14		283	134	110	33	124	14	2
B2	20.5	2.86	0.64	3376	7293	5.21	73	69	24	53	44	194	19	1	286	119	114	34	125	15	4
B2	21.5	2.89	0.64	3502	6908	5.27	67	68	24	49	46	192	17		282	127	127	48	129	15	3
B2	22.5	2.68	0.62	3583	5106	5.02	87	108	26	48	51	209	17	3	273	131	109	25	125	8	3
B2	23.5	2.94	0.67	3462	6514	5.14	113	74	21	59	49	212	21	10	294	125	117	40	129	18	4
B2	24.5	2.71	0.64	3345	7039	4.91	39	102	26	49	49	196	17	11	294	129	120	41	131	15	
B2	29.5	3.08	0.97	3421	15980	5.00	65	35	19	54	43	127	19	11	284	138	115	42	134	16	10
B2	34.5	3.22	0.75	3910	4377	5.39	125	85	26	55	43	140	20	8	324	150	115	44	138	19	8
B2	39.5	2.88	0.64	3652	5063	5.00	163	110	16	57	36	123	17		294	135	114	36	134	16	15
B2	44.5	2.93	0.67	3729	3484	5.19	149	98	27	53	42	121	19	14	321	130	106	35	130	15	5

Core: BBT-B

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
BBT-B	0.5	2.65	0.57	3264	9211	4.52	105	98	15	46	50	210	17	3	406	147	158	27	119	9	13
BBT-B	1.5	3.01	0.53	3861	765	4.61	98	116	23	56	58	236	19	12	340	143	123	42	141	9	9
BBT-B	2.5	3.04	0.48	3865	849	4.60	108	141	22	53	53	233	17	1	329	148	114	37	140	12	6
BBT-B	3.5	3.35	0.59	4338	1137	5.60	158	90	28	62	64	257	17	1	319	140	114	34	133	11	8
BBT-B	4.5	2.98	0.52	3856	1139	5.09	165	126	21	60	61	244	17	1	291	135	116	40	138	13	9
BBT-B	5.5	2.94	0.49	3642	1109	5.01	125	77	24	55	60	241	19	8	287	142	105	32	128	10	13
BBT-B	6.5	3.06	0.53	3994	1295	4.86	152	104	23	51	58	239	20	2	305	147	113	35	137	13	7
BBT-B	7.5	2.92	0.48	3957	1389	4.78	110	110	24	60	54	231	16	1	293	143	117	37	139	12	8
BBT-B	8.5	3.17	0.55	4079	1492	4.98	91	89	25	65	62	244	17	1	300	153	114	40	141	11	1
BBT-B	9.5	2.98	0.59	3761	2641	5.41	87	92	17	58	64	262	15	1	296	135	113	37	126	15	14
BBT-B	10.5	2.53	0.54	3072	4138	5.25	92	58	27	59	66	259	15	9	303	128	118	34	112	9	19
BBT-B	11.5	2.19	0.59	2577	6653	6.17	81	79	25	60	82	307	14	2	351	117	120	23	98	7	23
BBT-B	12.5	1.96	0.79	2112	6403	5.67	32	84	25	60	67	344	12	1	354	115	137	30	91	12	22
BBT-B	13.5	2.60	0.56	2877	2291	6.11	139	51	28	60	64	300	12	1	341	125	118	32	101	11	4
BBT-B	14.5	3.07	0.57	3887	1984	5.76	133	103	26	52	50	209	21	14	298	139	113	35	137	14	3
BBT-B	15.5	3.11	0.59	4022	2212	5.54	70	104	30	54	50	193	18	1	278	145	119	34	139	12	3
BBT-B	16.5	3.00	0.56	3980	1923	5.02	111	78	22	55	46	185	17	1	260	141	125	40	139	14	4
BBT-B	17.5	3.01	0.56	3901	1956	4.92	125	91	26	49	44	179	18	1	254	139	111	39	137	16	8
BBT-B	18.5	3.10	0.51	4185	1725	5.21	105	118	29	51	46	171	20	1	271	133	109	44	147	16	8

Core	Depth	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Ga	As	Br	Rb	Sr	Y	Zr	Nb	Mo
	cm	(%)	(%)	mg/kg	mg/kg	(%)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BBT-B	19.5	3.22	0.56	4192	1612	5.77	124	96	27	56	42	161	19	1	266	149	119	42	142	17	8
BBT-B	20.5	3.12	0.57	3971	1860	5.43	91	124	27	58	47	151	20	2	241	146	105	33	129	17	1
BBT-B	21.5	2.90	0.54	3818	2045	5.26	78	114	27	45	39	144	16	3	249	138	120	42	142	16	2
BBT-B	22.5	3.08	0.58	3904	2210	5.38	100	66	23	55	39	142	17	1	261	132	117	42	147	17	
BBT-B	23.5	3.01	0.55	4010	2636	5.45	71	101	21	49	41	140	17	1	243	137	116	41	137	15	3
BBT-B	24.5	2.97	0.60	3743	3030	5.87	132	101	25	44	34	137	15	1	242	132	118	38	141	18	
BBT-B	25.5	2.87	0.57	3749	2706	5.44	100	103	27	50	33	131	17	1	273	127	109	39	144	19	0
BBT-B	26.5	3.00	0.57	3873	2576	5.36	90	106	19	46	39	138	18	1	261	140	115	37	140	18	3
BBT-B	27.5	2.78	0.57	3833	2565	5.36	80	114	22	42	35	130	15	1	259	138	111	38	142	17	3
BBT-B	28.5	2.75	0.63	3514	2151	4.88	58	121	19	46	35	124	20	1	242	134	110	34	142	15	4
BBT-B	29.5	3.12	0.62	4003	2512	5.75	121	79	27	48	36	132	15	1	313	144	117	41	147	11	
BBT-B	30.5	2.84	0.58	3884	2605	5.90	122	79	28	36	26	126	19	13	256	134	121	42	149	15	
BBT-B	31.5	2.81	0.57	3769	2826	5.59	77	89	32	51	37	119	17	1	285	128	122	36	133	12	2
BBT-B	32.5	2.70	0.60	3794	4094	6.08	119	93	27	45	39	124	16	1	304	131	129	38	136	12	
BBT-B	33.5	2.81	0.74	3356	12602	6.14	75	37	26	38	36	113	17	22	281	130	118	39	137	13	3
BBT-B	34.5	2.71	0.78	3526	13463	6.19	60	76	31	44	44	116	17	6	273	139	118	46	144	13	9
BBT-B	35.5	2.58	0.63	3088	8141	5.03	105	71	20	41	31	112	16	3	255	137	113	34	139	14	9
BBT-B	36.5	3.00	0.56	3723	1684	4.60	108	111	23	47	39	125	18	1	301	138	114	41	139	10	6
BBT-B	37.5	3.00	0.60	3829	2105	5.14	85	107	24	45	33	119	18	19	284	131	121	39	142	14	11
BBT-B	38.5	3.11	0.58	4013	2395	5.80	75	104	28	40	37	117	19	5	268	137	115	33	138	11	7
BBT-B	39.5	3.06	0.58	3863	2280	5.57	95	111	24	49	31	114	16	1	295	136	118	44	143	15	2
BBT-B	40.5	3.11	0.59	4139	2269	5.63	90	105	24	46	34	121	17	1	288						
BBT-B	41.5	3.08	0.60	3944	2111	5.15	86	110	29	57	37	122	19	3	293						

Core: BBT-C

Core	Depth	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Ga	As	Br	Rb	Sr	Y	Zr	Nb	Mo
	cm	(%)	(%)	mg/kg	mg/kg	(%)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BBT-C	0.5	2.49	0.61	2823	5678	4.41	78	70	17	39	34	181	15	8	438	126	168	28	102	11	4
BBT-C	1.5	2.65	0.59	3157	3796	5.62	93	116	27	47	40	201	16	1	348	142	147	32	125	15	11
BBT-C	2.5	3.00	0.55	3655	1233	5.00	84	60	28	54	48	219	19	27	339	146	128	26	122	17	11
BBT-C	3.5	3.08	0.55	3858	1157	4.52	83	79	23	54	54	225	19	1	365	158	126	40	141	14	2
BBT-C	4.5	3.06	0.55	3810	2903	5.34	101	109	26	55	55	214	18	1	284	138	117	38	136	13	7
BBT-C	5.5	3.01	0.57	3872	1829	5.20	105	61	24	49	48	214	15	1	290	159	118	34	140	13	4
BBT-C	6.5	2.97	0.55	3790	1696	4.87	103	143	23	50	57	233	18	1	306	138	113	34	130	15	4
BBT-C	7.5	3.04	0.56	3890	1759	5.15	120	114	28	52	58	238	17	5	301	137	111	39	137	15	5
BBT-C	8.5	2.98	0.58	4068	1918	5.33	164	147	24	56	53	242	17	1	282	140	120	40	127	14	5
BBT-C	9.5	3.12	0.59	3862	2734	5.23	96	73	19	46	55	227	18	8	291	147	120	41	141	14	1
BBT-C	10.5	3.00	0.59	3600	3279	4.97	70	94	19	54	60	246	17	1	339	142	130	35	128	12	11
BBT-C	11.5	3.00	0.64	3725	4233	5.39	143	60	24	53	60	243	18	1	321	141	121	41	133	19	10
BBT-C	12.5	2.71	0.68	3519	5395	6.25	77	98	29	48	62	264	14	1	324	122	114	37	124	13	7
BBT-C	13.5	2.70	0.59	3652	2228	6.54	132	86	29	45	63	246	17	17	338	134	117	35	130	13	3
BBT-C	14.5	2.63	0.59	3397	1761	6.76	96	35	32	50	60	259	13	1	333	121	126	39	122	14	3
BBT-C	15.5	2.93	0.61	3974	2085	6.30	149	140	29	50	56	245	16	4	288	134	116	39	135	18	2
BBT-C	16.5	3.00	0.58	3927	2409	5.08	87	151	28	51	54	229	19	1	285	128	114	40	139	17	4
BBT-C	17.5	3.08	0.62	3943	3780	5.18	79	96	24	56	52	216	17	1	279	138	122	43	145	17	
BBT-C	18.5	2.96	0.63	3684	5654	5.23	94	132	27	51	55	229	18	11	275	133	121	33	136	16	1

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
BBT-C	19.5	3.19	0.78	3835	10786	5.60	121	112	30	60	63	236	17	1	300	130	130	33	134	12	0
BBT-C	20.5	2.82	0.76	3548	9746	5.14	96	69	23	47	50	228	15	1	273	131	132	41	136	14	
BBT-C	21.5	3.04	0.64	3951	4905	5.36	110	81	22	57	48	228	17	1	274	141	129	40	142	14	3
BBT-C	22.5	3.03	0.62	3851	3370	5.47	96	118	21	51	52	227	19	11	270	146	124	39	143	14	
BBT-C	23.5	3.27	0.67	4162	3980	6.00	136	80	27	56	62	249	20	5	301	144	121	36	133	15	2
BBT-C	24.5	3.15	0.62	4143	3664	5.57	106	115	26	50	54	235	18	1	299	141	127	37	138	15	3
BBT-C	25.5	3.07	0.63	3862	2808	5.28	133	71	25	52	49	184	18	1	303	133	118	42	141	8	
BBT-C	26.5	2.98	0.60	3913	2450	5.20	98	93	21	56	43	151	16	7	308	131	115	43	142	14	
BBT-C	27.5	3.11	0.63	4037	2477	5.22	102	83	21	48	46	148	18	2	301	140	121	41	146	17	5
BBT-C	28.5	3.11	0.62	3982	3277	5.32	129	45	23	50	41	168	14	1	275	137	118	42	146	15	1
BBT-C	29.5	3.11	0.63	3914	4689	5.41	106	86	25	49	41	203	16	1	274	132	119	41	135	13	5
BBT-C	30.5	2.96	0.65	3923	4696	5.38	85	76	25	49	48	208	17	3	263	131	111	37	130	13	5

Core: BBTA-98

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
BBTA-98	0.5	2.20	0.64	2668	2108	3.53	94	112	15	40	34	192	16	9	590	117	142	28	115	17	3
BBTA-98	1.5	2.74	0.62	3285	4025	5.12	64	54	26	46	46	205	15	5	415	135	122	34	124	14	6
BBTA-98	2.5	3.10	0.56	3879	1012	5.13	111	140	28	54	67	239	19		414	141	119	37	137	15	4
BBTA-98	3.5	3.25	0.54	3984	959	4.81	123	97	19	61	63	269	20	11	398	144	119	37	139	12	9
BBTA-98	4.5	2.89	0.51	3793	913	4.43	125	129	21	52	62	245	18		357	156	118	37	141	21	6
BBTA-98	5.5	3.00	0.53	3952	975	4.53	100	89	25	51	56	240	18	6	357	146	123	37	141	12	7
BBTA-98	6.5	3.13	0.56	4122	1265	5.20	150	84	25	53	61	250	20	16	368	155	129	41	150	16	
BBTA-98	7.5	3.04	0.55	3842	1131	5.32	133	112	26	51	64	249	18		343	141	108	37	122	13	10
BBTA-98	8.5	2.95	0.60	3769	2054	5.83	132	63	27	50	66	274	17	15	334	131	114	32	129	14	13
BBTA-98	9.5	2.97	0.63	3770	966	5.68	155	80	26	56	65	291	16	4	337	135	121	31	129	21	13
BBTA-98	10.5	3.19	0.56	4105	1174	5.14	104	108	20	59	54	237	15		335	141	118	34	140	14	2
BBTA-98	11.5	3.21	0.57	3995	1223	5.15	115	117	25	52	57	219	13		327	130	109	38	131	13	2
BBTA-98	12.5	3.31	0.58	4108	1335	5.30	136	106	25	68	54	225	20	11	318	150	120	38	148	16	3
BBTA-98	13.5	3.24	0.59	4149	1567	5.29	133	89	34	60	58	227	20		306	141	112	30	139	14	0
BBTA-98	14.5	3.25	0.59	4038	1706	5.24	149	122	23	55	56	233	15		305	148	116	38	139	13	5
BBTA-98	15.5	2.96	0.59	3891	1790	5.10	81	87	22	53	55	225	17		302	135	124	40	144	15	2
BBTA-98	16.5	3.53	0.65	4351	2181	6.10	94	128	30	64	67	259	18		345	130	110	32	129	9	3
BBTA-98	17.5	3.15	0.56	3998	2031	5.24	96	112	26	61	57	236	19		310	135	118	39	132	10	2
BBTA-98	18.5	3.14	0.61	4047	2258	5.35	97	86	21	52	54	232	19		304	144	116	34	128	8	
BBTA-98	19.5	3.32	0.64	4127	2696	5.71	81	100	30	50	55	221	19		310	142	111	39	139	16	1
BBTA-98	20.5	3.09	0.62	3848	2438	5.58	48	80	23	55	44	188	16	2	293	133	109	38	134	13	4
BBTA-98	20.5	3.09	0.62	3848	2438	5.58	48	80	23	55	44	188	17	2	293	133	114	32	134	10	7
BBTA-98	21.5	3.13	0.63	4095	2461	5.79	128	87	28	54	46	183	19	6	306	144	120	43	137	14	
BBTA-98	22.5	3.08	0.60	4011	2360	5.53	166	80	24	61	49	192	19		309	143	119	42	133	13	2
BBTA-98	23.5	3.47	0.65	4279	2640	5.66	88	98	27	59	59	206	19	5	319	137	120	40	146	17	10
BBTA-98	24.5	3.06	0.62	3976	2153	5.33	133	116	27	53	48	188	17		300	130	110	43	137	17	8
BBTA-98	25.5	3.24	0.61	4076	2054	4.93	70	68	24	60	40	158	18		289	127	111	41	139	12	5
BBTA-98	26.5	3.40	0.63	4282	2690	5.33	145	113	26	62	45	154	19	6	307	135	112	39	138	17	12
BBTA-98	27.5	3.08	0.53	4056	1715	5.29	123	72	26	47	38	137	18	3	285	123	106	40	134	16	12
BBTA-98	28.5	3.22	0.62	4065	1950	5.81	131	60	29	59	45	139	17	9	297	152	125	35	144	19	6

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
BBTA-98	29.5	3.10	0.59	4089	1464	4.89	102	115	24	54	43	134	18		311	133	119	39	139	16	3
BBTA-98	30.5	2.92	0.54	3969	1606	4.96	104	106	24	54	41	131	17		327	130	110	43	142	15	
BBTA-98	31.5	3.07	0.58	3805	1843	4.94	109	100	25	53	41	129	17		334	132	109	37	137	14	
BBTA-98	33.5	3.01	0.60	3817	1803	5.10	85	70	24	50	35	122	17		308	137	116	43	141	14	7
BBTA-98	34.5	3.27	0.65	4183	2169	5.46	95	87	23	57	48	130	19		319	136	118	49	146	11	0

Core: BBTB-98

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
BBTB-98	0.5	2.62	0.62	3139	1773	4.84	54	78	23	55	52	223	14		494	125	129	31	118	12	10
BBTB-98	1.5	3.11	0.64	3820	2834	5.39	127	63	31	67	57	240	17		400	152	129	41	128	13	9
BBTB-98	2.5	2.94	0.60	3795	1079	4.96	150	95	21	51	50	230	16		359	140	128	41	133	10	12
BBTB-98	3.5	3.08	0.59	3892	1193	5.07	99	116	31	60	58	226	19		347	139	118	41	134	11	1
BBTB-98	4.5	2.99	0.61	3666	1879	5.11	94	55	22	58	67	239	19	11	360	139	128	40	134	12	7
BBTB-98	5.5	3.03	0.61	3720	2638	5.07	90	74	28	61	59	242	18		341	137	114	39	128	11	8
BBTB-98	6.5	2.91	0.58	3815	1980	5.07	115	107	26	61	55	238	17		340	141	110	32	132	21	10
BBTB-98	7.5	3.01	0.56	3723	2202	5.20	104	64	30	54	55	242	17	1	340	140	115	39	127	12	8
BBTB-98	8.5	3.09	0.58	4009	2030	5.12	133	117	27	57	59	247	15	2	342	137	125	42	139	17	11
BBTB-98	9.5	3.06	0.61	3908	1734	5.13	137	96	30	55	64	260	20	16	345	129	118	39	134	15	5
BBTB-98	10.5	2.85	0.59	3513	3032	4.90	118	116	27	58	63	233	19	12	336	144	125	33	131	15	3
BBTB-98	11.5	2.70	0.55	3500	2185	4.89	72	113	26	60	67	258	17	18	370	142	126	38	131	12	5
BBTB-98	12.5	2.46	0.55	3007	1148	4.68	93	84	21	62	70	266	15	4	425	127	125	30	107	12	27
BBTB-98	13.5	2.58	0.55	3283	1635	5.07	105	97	29	64	65	266	14		381	133	116	37	130	17	23
BBTB-98	14.5	2.52	0.56	3198	3119	5.11	106	131	23	58	58	263	14	6	359	116	109	34	115	12	14
BBTB-98	15.5	2.66	0.60	3320	3101	5.49	75	60	25	56	55	232	15		337	123	118	38	119	17	11
BBTB-98	16.5	3.18	0.70	4029	3628	6.25	116	47	32	60	57	210	18		345	133	109	27	120	3	9
BBTB-98	17.5	3.06	0.63	4030	3075	5.50	131	112	26	52	42	172	19	12	297	139	114	40	146	9	8
BBTB-98	18.5	3.28	0.66	4185	3408	5.86	123	59	25	52	47	170	18		299	129	126	36	135	14	7
BBTB-98	19.5	3.17	0.63	4099	3646	5.70	141	96	26	49	40	171	18	8	290	138	113	41	125	11	5
BBTB-98	20.5	3.26	0.65	3920	4382	5.71	96	58	28	61	48	173	19	8	290	131	111	37	134	12	4
BBTB-98	21.5	3.14	0.65	4244	3998	5.61	102	76	27	46	44	166	14		288	128	106	45	131	8	1
BBTB-98	22.5	3.25	0.66	4304	4189	5.58	133	117	26	56	40	173	16		294	127	113	35	128	8	2
BBTB-98	23.5	3.40	0.71	4332	4493	5.75	126	85	31	52	47	179	19	7	301	133	116	44	133	12	4
BBTB-98	24.5	3.23	0.64	4137	4599	5.59	97	97	27	52	47	182	18		289	137	120	38	133	12	2
BBTB-98	25.5	3.35	0.65	4186	4478	5.72	87	95	31	64	52	188	16		290	132	117	40	133	13	5
BBTB-98	26.5	3.30	0.64	4124	3768	5.61	122	98	27	49	46	165	17	3	308	138	112	36	138	14	6
BBTB-98	27.5	3.19	0.62	4073	2952	5.54	97	96	28	55	44	151	17	5	295	134	114	31	131	11	7
BBTB-98	28.5	3.12	0.63	3933	3368	5.36	107	83	27	52	46	152	17		298	128	112	38	131	12	2
BBTB-98	29.5	3.30	0.65	4290	2876	5.72	115	154	28	61	48	149	19		314	152	124	38	147	15	7
BBTB-98	30.5	2.71	0.50	3468	2181	4.86	74	89	27	51	35	118	18	10	278	121	98	37	140	15	2
BBTB-98	31.5	3.13	0.62	4178	2296	5.43	135	118	24	61	41	122	18		309	142	111	38	139	18	5
BBTB-98	32.5	3.80	0.75	4738	2703	6.44	137	113	30	59	48	140	20	7	357	134	114	37	142	12	4
BBTB-98	33.5	3.12	0.63	4114	2114	5.26	128	129	26	51	37	126	18	9	299	121	108	36	141	13	
BBTB-98	34.5	2.66	0.53	3355	1980	4.59	97	67	24	44	31	110	16	11	261	155	128	39	146	13	6

Appendix B2

EDX Results of Gotland Basin cores (calibrated against intern. geological reference materials)

Core: GBT-C

Core	Depth	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Ga	As	Br	Rb	Sr	Y	Zr	Nb	Mo
	cm	(%)	(%)	mg/kg	mg/kg	(%)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GBT-C	0.5	1.41	0.62	1231	157	3.03	17	54	10	72	123	290	20	32	328	41	88	6	33		47
GBT-C	1.5	1.59	0.56	1607	279	3.83	78	57	18	85	138	483	14	46	492	83	123	18	60	10	101
GBT-C	2.5	1.35	0.47	1229	344	3.16	25	76	9	48	126	297	14	12	459	58	102	12	42		92
GBT-C	3.5	1.60	0.56	1709	486	2.48	9	57	9	63	112	339	18	20	484	78	115	18	64	5	115
GBT-C	4.5	1.67	0.62	2038	613	2.64	34	76	7	71	123	379	19	11	337	76	97	17	62	8	118
GBT-C	5.5	1.87	0.66	2358	662	3.13	31	107	14	91	157	530	18	31	358	94	103	24	78	12	160
GBT-C	6.5	2.07	0.73	2621	1034	4.63	95	104	25	119	224	710	16	53	426	84	115	30	88	11	187
GBT-C	7.5	1.77	0.71	1987	2309	6.86	92	35	34	122	189	637	14	10	288	91	109	13	66	3	161
GBT-C	8.5	1.39	3.55	406	138580	5.14		44		62	84	367	10	59	193	44	189	13	43	9	96
GBT-C	9.5	1.49	4.99	66	187687	4.69		13		43	60	337	12	60	127	46	235	24	52	6	105
GBT-C	10.5	1.59	4.00	522	1000000	6.08		13		25	53	304	12	56	126	63	193	14	52	2	109
GBT-C	11.5	1.99	0.97	2323	19240	7.19	72	106	36	64	122	413	17	58	246	108	134	21	77	7	172
GBT-C	12.5	2.72	3.64	2203	90181	5.12		96		30	41	269	14	27	120	102	165	21	43	9	23
GBT-C	13.5	3.46	2.19	3538	59475	5.94	114	136	8	47	49	281	20	33	137	110	139	31	85	5	28
GBT-C	14.5	3.08	2.64	2534	70859	5.61	61	72	6	39	34	229	16	27	121	124	159	30	87	6	45
GBT-C	15.5	3.04	1.50	3062	33935	6.17	90	88	26	54	76	245	17	43	156	132	135	32	102	8	108
GBT-C	16.5	3.00	2.78	2351	86318	4.97		51	4	41	28	149	18	39	95	113	175	19	79	7	25
GBT-C	17.5	3.24	1.74	3140	51505	4.20	30	77	1	50	43	164	22	15	123	142	150	30	92	5	34
GBT-C	18.5	3.66	1.11	3782	24015	5.09	49	47	16	47	39	154	23	17	140	151	129	35	107	13	25
GBT-C	19.5	3.38	1.46	3408	39375	5.65	19	67	19	44	38	137	21	18	120	135	140	37	101	6	25
GBT-C	20.5	3.15	1.21	3287	35890	5.62	81	84	13	50	44	144	18	19	118	140	139	32	106	12	26
GBT-C	21.5	3.28	1.74	3285	55051	4.84	69	112	4	41	38	135	20	32	114	129	143	34	93	7	20
GBT-C	22.5	2.60	0.80	2862	21216	4.46	103	72	16	46	37	121	18	15	99	149	125	32	111	13	33
GBT-C	23.5	3.52	1.34	3580	34248	5.46	72	73	16	55	42	136	20	26	108	148	137	35	113	12	31
GBT-C	24.5	3.31	1.00	3665	25061	5.73	113	90	19	53	40	120	18	1	116	148	133	33	119	14	33
GBT-C	25.5	3.26	1.12	3267	31839	6.10	85	53	18	46	44	116	22	22	136	141	139	34	107	8	31
GBT-C	26.5	3.40	1.40	3415	40130	5.08	48	66	19	49	43	119	20	22	106	151	129	33	109	9	40
GBT-C	27.5	3.21	1.49	3197	40855	6.09	69	100	24	42	30	110	19	45	104	143	142	26	100	7	44
GBT-C	28.5	3.51	1.28	3665	31861	5.05	66	99	17	51	47	123	20	22	113	141	130	43	108	13	39
GBT-C	29.5	3.65	0.86	4206	14149	6.41	157	81	27	57	54	134	21	13	134	157	120	24	109	10	48
GBT-C	30.5	3.84	1.20	4284	33847	6.69	99	138	26	51	48	132	22	31	129	144	129	26	106	12	57
GBT-C	31.5	3.65	1.71	3634	55789	6.58	48	68	19	47	49	120	24	41	126	134	128	24	100	6	50
GBT-C	32.5	3.42	1.73	3352	51298	4.63	78	93	9	46	47	116	21	31	115	139	148	33	95	7	65
GBT-C	33.5	3.27	2.14	3206	61065	4.98	6	46	5	46	41	106	20	33	99	133	156	34	101	11	47
GBT-C	34.5	3.64	0.72	3938	12419	5.77	107	84	34	60	48	121	24	24	108	167	121	34	121	14	55
GBT-C	35.5	3.39	1.07	3552	28471	5.31	130	73	13	48	40	113	20	32	102	154	140	31	106	12	48
GBT-C	36.5	3.40	0.83	3771	18959	5.79	40	114	18	46	43	116	18	1	130	152	118	33	108	10	40
GBT-C	37.5	3.43	1.05	3681	27688	5.68	92	76	21	54	51	126	21	25	124	132	122	32	107	12	39
GBT-C	38.5	3.35	1.08	3593	25296	5.53	116	79	18	57	53	128	19	19	120	140	123	24	106	11	50

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
GBT-C	39.5	3.33	1.64	3138	48280	5.41	58	62	13	47	60	117	15	19	113	119	143	33	99	7	65
GBT-C	40.5	3.27	1.68	3199	48586	5.48	88	62	18	49	49	108	20	39	109	126	149	24	97	13	48
GBT-C	41.5	3.22	1.17	3468	30612	6.14	71	50	19	61	60	121	17	21	127	129	129	33	96	10	63
GBT-C	42.5	3.51	1.19	3612	30586	5.15	99	103	15	55	56	131	20	25	137	138	128	36	116	11	52
GBT-C	43.5	3.21	0.92	3551	17602	5.48	128	53	22	58	56	130	18	16	124	140	121	33	114	9	53
GBT-C	44.5	3.01	1.22	3196	32727	5.90	77	66	15	52	65	114	19	31	123	122	126	30	91	7	61
GBT-C	45.5	3.26	1.79	3100	49970	5.05	47	68	12	43	37	110	20	13	111	134	141	33	99	10	37
GBT-C	46.5	2.77	2.34	2626	67108	5.18	16	67	7	57	43	107	17	33	116	112	145	26	87	8	58
GBT-C	47.5	2.95	2.07	2588	58771	5.61	75	49	7	49	50	113	18	36	112	111	136	28	87	11	61
GBT-C	48.5	2.83	2.68	2312	77895	5.33		21	5	40	54	102	16	48	111	100	158	29	85	10	100
GBT-C	49.5	3.01	1.08	3291	21954	5.68	117	58	22	63	87	140	17	10	175	121	117	35	104	15	93
GBT-C	50.5	2.83	1.76	2788	44523	6.35	84	48	22	65	93	130	14	53	132	112	133	26	86	7	140
GBT-C	51.0	3.43	0.78	3896	13511	5.74	100	114	28	56	71	139	20	24	164	146	126	36	123	17	70

Appendix B3

EDX Results of North Central Basin cores (calibrated against intern. geological reference materials)

Core: NCBT-A

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-A	0.5	1.85	0.65	1625	683	2.93	49	41	8	62	34	282	17	23	367	77	103	15	40	3	18
NCBT-A	1.5	2.33	0.75	2728	1377	4.64	81	49	26	89	72	381	19	24	344	106	114	19	74	10	63
NCBT-A	2.5	2.49	1.04	2790	15284	4.99	144	105	20	84	113	485	14	29	355	105	137	27	97	5	102
NCBT-A	3.5	2.28	0.75	2633	1416	5.41	133	82	28	103	137	660	14	21	365	117	136	33	96	10	102
NCBT-A	4.5	2.67	0.85	3239	1984	7.56	90	78	40	72	86	610	15	18	268	129	117	25	103	14	48
NCBT-A	5.5	3.47	0.70	4420	1605	6.17	107	89	33	55	46	244	22	22	137	174	130	41	130	20	9
NCBT-A	6.5	3.77	0.70	5093	1327	6.32	161	133	33	48	43	235	23	15	127	176	126	41	131	14	6
NCBT-A	7.5	3.79	0.67	5011	1236	5.92	130	122	30	51	47	211	24	12	99	164	117	37	133	17	6
NCBT-A	8.5	4.03	0.72	4988	1183	6.11	174	85	32	52	50	194	25	19	98	179	122	42	145	16	6
NCBT-A	9.5	4.04	0.70	5474	1151	6.18	228	153	26	57	48	174	26	7	98	176	127	41	146	17	4
NCBT-A	10.5	3.83	0.72	5183	1186	5.80	157	119	29	49	44	159	24	11	100	179	127	41	155	12	3
NCBT-A	11.5	3.83	0.67	5121	1103	5.88	234	127	33	50	35	144	27	10	90	172	123	39	141	17	2
NCBT-A	12.5	3.90	0.67	5102	1065	6.07	124	122	36	54	36	142	24	21	90	168	123	44	139	17	4
NCBT-A	13.5	3.84	0.66	5110	1050	6.19	153	131	33	53	40	139	25	14	95	174	126	46	144	20	2
NCBT-A	14.5	3.89	0.68	5074	1076	6.08	184	151	31	45	36	140	26	25	86	172	126	38	136	13	
NCBT-A	15.5	3.71	0.68	5070	1034	6.04	226	154	35	53	34	136	25	8	90	171	120	38	128	18	2
NCBT-A	16.5	3.76	0.67	4933	936	5.93	88	66	34	53	32	130	24	20	87	170	123	40	130	14	
NCBT-A	17.5	3.85	0.69	5117	1005	6.00	193	144	32	52	37	132	22	6	86	173	122	42	127	14	4
NCBT-A	18.5	3.83	0.67	4946	1020	6.22	162	145	30	50	38	132	24	8	87	178	131	41	137	16	10
NCBT-A	19.5	4.28	0.74	5403	1112	6.78	164	181	37	51	40	140	26	4	91	175	127	43	126	12	4
NCBT-A	20.5	3.63	0.67	4695	957	5.87	153	89	25	55	29	128	20	1	85	172	116	37	130	17	1
NCBT-A	21.5	3.95	0.69	4982	1002	6.20	113	148	32	53	43	133	26	11	89	171	126	48	132	15	
NCBT-A	22.5	3.84	0.68	4947	960	5.86	128	131	32	62	37	139	25	2	91	169	126	37	131	21	3
NCBT-A	23.5	4.14	0.73	5380	1010	6.14	224	141	30	48	38	139	24	9	92	184	136	43	137	15	3
NCBT-A	24.5	3.80	0.68	5096	987	5.77	138	131	24	53	32	133	21	7	87	176	122	36	137	16	2
NCBT-A	25.5	3.75	0.67	4664	941	5.58	140	113	25	53	35	131	20	1	84	165	125	39	128	13	4
NCBT-A	26.5	3.68	0.67	4724	975	5.73	123	176	28	52	31	128	26	13	84	182	128	36	129	17	3
NCBT-A	27.5	3.62	0.68	4556	967	5.57	164	84	23	57	30	130	23	1	80	172	128	41	126	15	3

Core: NCBT-B

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-B	0.5	2.17	0.73	2306	1796	3.66	130	44	13	80	36	316	20	11	278	91	108	13	49	0	12
NCBT-B	1.5	2.20	0.62	2618	964	3.80	86	106	14	87	63	342	21	13	196	99	105	29	77	12	44
NCBT-B	2.5	2.39	0.95	2819	9442	5.15	63	106	22	95	113	467	17	13	321	122	123	33	94	15	126
NCBT-B	3.5	2.18	0.75	2489	1720	5.28	75	76	24	100	137	575	17	26	311	110	112	16	89	17	113
NCBT-B	4.5	2.00	0.66	2298	1585	6.69	102	71	32	78	109	665	13	36	285	113	123	31	85	12	67

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-B	5.5	2.45	0.71	3223	5934	8.68	83	74	37	46	44	358	13	13	171	155	136	25	101	14	15
NCBT-B	6.5	3.39	0.72	4285	1813	6.68	105	73	32	51	42	241	21	1	157	171	137	36	124	17	5
NCBT-B	7.5	3.56	0.66	4513	1482	6.75	152	107	33	51	41	228	22	3	92	180	128	39	125	16	4
NCBT-B	8.5	3.92	0.78	5077	1468	6.94	120	99	35	61	43	235	24	1	91	167	125	37	130	15	3
NCBT-B	9.5	3.83	0.72	4907	1313	6.18	148	129	35	57	42	203	24	11	88	161	126	44	130	17	6
NCBT-B	10.5	4.00	0.81	5314	1311	6.29	110	102	31	52	39	187	22	11	90	174	120	38	136	18	1
NCBT-B	11.5	3.84	0.71	5042	1296	6.04	119	107	32	56	42	173	21	1	90	170	123	43	135	15	4
NCBT-B	12.5	3.82	0.74	4976	1309	6.17	116	98	29	56	37	170	24	19	77	181	122	48	132	17	1
NCBT-B	13.5	3.63	0.70	4707	1223	6.27	113	76	28	51	31	155	21	6	86	173	120	45	134	17	0
NCBT-B	14.5	3.71	0.67	4778	1258	6.19	131	90	30	51	29	152	20	4	80	173	125	43	129	13	0
NCBT-B	15.5	3.69	0.69	4714	1188	5.92	142	115	29	52	30	153	22	2	79	175	126	42	127	18	0
NCBT-B	16.5	3.89	0.70	4942	1190	6.06	91	123	30	62	37	158	24	13	79	169	122	41	132	20	0
NCBT-B	17.5	3.67	0.67	4958	1172	5.95	95	133	31	49	32	152	23	18	83	170	120	41	129	19	0
NCBT-B	18.5	4.18	0.77	5318	1296	6.41	179	122	35	58	42	163	26	15	91	172	121	48	137	24	0
NCBT-B	19.5	3.92	0.65	5108	1232	6.16	151	168	31	48	41	154	24	1	83	176	121	41	134	19	0
NCBT-B	20.5	3.97	0.69	5043	1224	6.19	176	109	27	52	36	156	22	10	86	169	122	48	136	18	0
NCBT-B	21.5	3.86	0.66	4848	1228	5.92	129	79	30	56	39	149	22	1	85	167	120	39	123	14	1
NCBT-B	22.5	3.89	0.69	4997	1262	6.15	100	109	34	54	39	151	22	7	88	168	121	44	132	18	0
NCBT-B	23.5	3.96	0.74	5257	1338	6.46	96	167	33	62	44	158	23	6	94	162	122	39	131	16	2
NCBT-B	24.5	3.73	0.65	4781	1196	6.10	84	96	31	49	41	142	24	10	84	172	139	47	128	17	3
NCBT-B	25.5	3.75	0.71	4860	1219	6.13	121	141	33	59	40	142	21	1	94	164	124	42	124	16	0
NCBT-B	26.5	3.94	0.73	4991	1249	6.34	122	78	31	58	39	142	23	1	95	165	118	37	131	15	0
NCBT-B	27.5	3.55	0.63	4583	1162	5.79	117	101	31	57	39	137	24	7	77	172	121	36	126	13	1
NCBT-B	28.5	3.92	0.68	4939	1208	6.19	126	119	34	48	39	136	24	5	82	171	122	41	128	19	2
NCBT-B	29.5	3.79	0.70	4954	1241	6.42	183	94	34	62	40	137	22	1	85	178	129	40	128	15	2
NCBT-B	30.5	3.71	0.66	4780	1208	6.16	170	142	32	50	36	129	21	1	87	165	129	44	128	15	1
NCBT-B	31.5	3.57	0.65	4587	1130	5.93	122	140	34	54	40	130	23	1	81	178	124	44	125	15	0
NCBT-B	32.5	3.55	0.61	4539	1145	5.96	149	158	31	51	31	128	23	2	84	177	122	40	120	12	1

Core: NCBT-C

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-C	0.5	2.50	0.93	3168	11366	8.81	69	62	19	83	55	361	14	39	501	109	131	24	74	5	57
NCBT-C	1.5	2.06	0.79	2360	6116	5.66	100	60	27	82	99	377	15	33	388	116	133	30	85	6	105
NCBT-C	2.5	1.78	0.68	2142	1194	4.86	67	100	24	65	137	386	13	32	399	114	132	18	77	10	63
NCBT-C	3.5	2.09	1.08	2161	19905	4.96	57	51	19	72	134	466	13	32	359	103	138	26	73	8	56
NCBT-C	4.5	1.78	1.40	1474	46090	3.52	22	55	5	66	79	458	16	37	298	108	141	26	88	12	77
NCBT-C	5.5	2.19	0.91	2699	11838	5.38	102	128	24	83	181	560	15	32	264	120	135	29	90	12	78
NCBT-C	6.5	2.22	0.91	2512	7409	6.21	103	64	32	95	117	642	16	16	292	112	124	24	90	13	83
NCBT-C	7.5	1.86	0.81	2462	2185	7.68	82	70	34	87	134	689	13	14	259	112	143	23	85	10	87
NCBT-C	8.5	2.13	0.81	2456	6281	8.42	52	37	46	68	61	526	17	29	250	119	130	32	91	12	53
NCBT-C	9.5	2.50	0.93	3168	11366	8.81	84	44	45	53	46	361	15	16	164	124	128	33	107	17	22
NCBT-C	10.5	3.24	0.72	4123	2651	7.32	105	65	32	48	44	236	20	10	122	165	134	36	130	18	9
NCBT-C	11.5	3.44	0.71	4582	1530	6.03	115	110	33	55	52	233	23	1	104	174	134	38	124	15	6
NCBT-C	12.5	3.62	0.74	4526	1495	6.56	101	65	33	54	46	234	24	9	99	152	122	47	134	15	10
NCBT-C	13.5	3.82	0.72	4534	1471	6.55	137	102	32	52	40	212	24	10	102	177	133	41	124	18	7

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-C	14.5	3.76	0.73	4780	1423	6.07	111	130	31	57	34	187	21	1	100	169	132	34	126	12	5
NCBT-C	15.5	3.82	0.72	4928	1377	6.09	122	82	33	59	43	182	24	5	80	169	129	36	123	14	1
NCBT-C	16.5	3.62	0.74	4791	1477	6.11	172	83	30	58	42	175	24	10	86	175	128	40	133	22	2
NCBT-C	17.5	3.71	0.75	4784	1321	6.01	130	113	26	52	35	168	22	1	84	179	127	37	126	20	
NCBT-C	18.5	3.68	0.66	4728	1400	6.15	88	83	31	47	33	163	24	24	79	164	119	34	119	19	0
NCBT-C	19.5	4.04	0.76	5156	1575	7.13	131	97	35	64	47	176	23	1	112	175	131	39	130	18	
NCBT-C	20.5	4.24	0.80	5532	1645	7.21	160	137	36	57	41	184	23	1	98	170	127	35	129	12	
NCBT-C	21.5	3.66	0.74	4681	1469	6.26	122	112	34	57	35	172	20	1	95	172	129	38	127	16	
NCBT-C	22.5	3.58	0.73	4800	1469	6.38	133	101	31	42	33	170	23	16	89	167	127	34	127	14	5
NCBT-C	23.5	3.71	0.71	4660	1450	6.32	130	100	33	55	38	167	23	13	86	174	122	37	119	14	
NCBT-C	24.5	3.70	0.69	4749	1419	6.20	144	104	34	56	41	163	23	9	81	168	128	39	132	20	0
NCBT-C	25.5	3.76	0.70	4794	1357	6.12	118	129	31	57	34	162	24	9	83	174	128	41	126	18	0
NCBT-C	26.5	4.25	0.75	5123	1515	6.61	148	97	33	51	38	168	24	8	85	164	125	35	114	15	
NCBT-C	27.5	3.59	0.66	4609	1371	5.93	141	141	36	49	34	157	27	10	75	177	133	31	122	16	
NCBT-C	28.5	3.87	0.69	4742	1391	6.03	172	113	31	54	33	156	24	11	73	175	130	43	121	18	
NCBT-C	29.5	3.84	0.71	4782	1367	6.04	144	86	35	49	32	154	23	1	76	173	128	38	129	18	
NCBT-C	30.5	3.61	0.71	4574	1330	5.84	108	135	26	54	28	150	20	13	76	179	134	43	124	19	1
NCBT-C	31.5	3.87	0.68	4678	1333	5.95	142	89	31	50	33	154	24	13	82	175	131	39	135	17	2
NCBT-C	32.5	3.58	0.69	4664	1356	5.77	133	132	29	56	32	147	25	23	81	165	130	36	126	16	
NCBT-C	33.5	3.92	0.73	4832	1428	6.28	108	86	33	51	40	160	24	1	85	176	124	35	125	13	1
NCBT-C	34.5	3.71	0.69	4587	1301	5.85	82	74	32	49	34	147	24	22	82	166	122	38	124	20	
NCBT-C	35.5	3.60	0.66	4546	1357	5.85	150	127	26	50	31	151	22	1	79	164	119	36	118	19	0
NCBT-C	36.5	3.67	0.63	4691	1362	6.00	118	92	31	60	33	150	24	8	79	172	127	28	114	14	0
NCBT-C	37.5	3.87	0.71	4903	1344	6.21	89	91	30	46	34	151	23	8	86	164	124	36	124	18	2

Core: NCBT-D

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-D	0.5	1.64	1.09	1595	26035	3.84	66	62	5	66	45	364	15	23	398	93	151	19	63	8	75
NCBT-D	1.5	1.56	0.90	1469	22603	3.97	51	72	10	54	67	328	16	24	391	84	130	27	72	7	76
NCBT-D	2.5	1.57	1.23	1110	45210	4.90	6	34	6	53	85	309	14	41	400	65	140	21	59	12	56
NCBT-D	3.5	2.08	1.10	2180	25184	5.20	47	76	14	79	111	492	18	29	293	104	139	29	81	9	69
NCBT-D	4.5	1.89	2.25	1636	93869	3.88	72	125		67	68	473	17	60	229	87	165	25	77	7	42
NCBT-D	5.5	2.07	1.48	1689	64433	3.88	3	99		48	71	390	16	40	258	78	164	21	67	10	81
NCBT-D	6.5	2.42	0.77	3044	3714	5.00	55	88	21	71	154	561	18	35	265	119	124	26	108	14	51
NCBT-D	7.5	1.84	0.75	2314	2108	4.57	106	69	22	79	248	696	13	56	343	86	122	29	81	8	57
NCBT-D	8.5	1.91	0.76	2435	3574	5.98	85	87	17	78	131	697	19	74	293	92	117	20	80	13	47
NCBT-D	9.5	2.36	1.03	2706	16001	6.48	113	76	27	91	125	656	13	16	327	100	139	27	89	11	83
NCBT-D	10.5	1.94	0.73	2650	2736	7.20	65	97	37	85	295	931	15	31	271	104	127	25	85	10	96
NCBT-D	11.5	1.89	0.79	2218	6882	8.53	85	13	36	71	109	573	15	5	270	103	138	28	84	11	71
NCBT-D	12.5	2.31	1.85	2394	52268	8.94	29	37	28	37	43	344	14	27	117	102	177	25	91	10	49
NCBT-D	13.5	2.57	2.13	2574	57020	8.31	91	98	20	29	36	262	15	33	121	122	181	21	86	14	20
NCBT-D	14.5	3.49	0.99	4016	16468	7.67	104	93	43	41	31	250	21	36	106	156	137	31	115	14	9
NCBT-D	15.5	3.54	0.75	4662	2005	6.44	71	93	33	50	44	227	21	13	110	166	139	47	128	16	7
NCBT-D	16.5	3.62	0.75	4645	1766	6.02	151	110	31	54	42	231	25	19	97	171	137	45	139	19	0
NCBT-D	17.5	3.64	0.72	4464	1691	6.28	100	119	39	52	43	220	22	2	99	179	130	38	133	19	4

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
NCBT-D	18.5	3.86	0.75	4869	2017	6.52	106	76	37	52	36	200	24	4	89						
NCBT-D	19.8	3.65	0.69	4608	2244	6.34	78	103	37	49	43	183	25	30	91	181	133	41	132	16	0
NCBT-D	20.8	3.83	0.68	4932	1662	6.05	141	112	24	53	35	183	25	24	78						
NCBT-D	21.8	3.97	0.77	5228	1665	6.09	110	90	34	54	40	172	26	28	87	177	132	42	135	19	
NCBT-D	22.8	3.78	0.72	5234	1743	6.31	131	107	34	54	39	175	24	16	86	169	128	43	136	17	
NCBT-D	23.8	3.96	0.75	5111	1775	6.35	137	103	32	48	36	172	25	25	100	171	123	36	134	15	
NCBT-D	24.8	4.09	0.79	5297	1775	6.60	126	96	35	62	46	176	28	18	94	167	135	36	133	13	
NCBT-D	25.8	3.67	0.70	4845	1564	6.37	112	85	33	47	42	161	26	19	86	173	134	40	136	17	
NCBT-D	26.8	3.80	0.71	5043	1684	6.39	136	94	38	47	40	168	29	35	86	176	126	35	134	16	
NCBT-D	27.8	3.78	0.72	4753	1651	6.09	166	105	33	50	26	164	23	11	85	178	133	35	128	11	
NCBT-D	28.8	3.70	0.73	4791	1734	6.14	93	83	28	51	31	167	25	30	90	180	124	39	130	16	
NCBT-D	29.8	3.55	0.68	4636	1838	6.20	136	106	29	50	37	162	24	22	86	169	133	39	126	14	
NCBT-D	30.8	3.93	0.73	4928	1989	6.56	147	115	37	58	39	171	25	19	93	172	134	39	133	19	4
NCBT-D	31.8	3.84	0.70	4950	1892	6.22	127	100	30	52	38	166	26	18	87	187	135	42	123	13	1
NCBT-D	32.8	3.70	0.67	4816	1969	6.06	101	112	28	46	33	156	22	7	87	171	128	40	129	15	2
NCBT-D	33.8	3.76	0.72	4801	2101	6.28	113	84	33	53	35	160	27	26	88	169	128	39	119	16	
NCBT-D	34.8	3.70	0.65	4685	1986	6.04	134	105	32	56	37	159	24	22	88	178	125	36	122	14	
NCBT-D	35.8	3.52	0.63	4486	1825	5.69	93	133	29	51	32	149	22	15	86	187	137	41	127	20	
NCBT-D	36.8	3.89	0.69	5135	1775	6.19	145	100	28	49	34	158	24	7	79	168	126	38	127	17	
NCBT-D	37.8	3.59	0.65	4633	1600	5.81	117	91	31	47	30	153	24	23	88	171	125	32	131	15	
NCBT-D	38.8	3.68	0.68	4793	1690	6.16	89	97	25	55	43	156	27	21	76	170	126	36	125	16	
NCBT-D	39.8	3.74	0.65	5049	1568	6.08	100	67	26	57	31	155	26	16	87	177	129	41	131	18	
NCBT-D	40.8	3.97	0.72	5023	1606	6.25	153	98	35	55	33	153	25	11	89	171	128	36	119	17	0
NCBT-D	41.8	3.67	0.66	4495	1514	5.87	115	51	29	56	33	146	24	33	79	174	126	43	124	19	
NCBT-D	42.8	3.68	0.60	4462	1416	5.71	111	75	28	50	30	145	25	21	78	178	124	36	120	20	0
NCBT-D	43.8	3.41	0.60	4400	1385	5.67	86	69	24	53	30	143	21	15	85	170	132	39	119	14	
NCBT-D	44.8	3.61	0.65	4635	1481	6.04	93	77	29	57	33	150	24	14	86	180	134	39	135	18	0

Appendix C

EDX: Results of cores (calibrated against intern. geological reference materials)

Core:211630-9-9 1 m section (Bornholm Basin)

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	17.5	2.64	1.06	3126	2301	3.61	83	80	12	33	22	99	27	18	136	100	92	24	65	1	1
211630-9	18.5	3.00	0.72	3689	6000	4.91	88	77	18	41	28	218	24	3	195	127	104	31	116	13	
211630-9	19.5	2.73	1.00	3163	4523	3.89	58	71	10	36	28	210	25	16	138	77	88	20	81	12	2
211630-9	20.5	2.82	0.63	3357	6422	4.32	80	123	13	40	24	385	21	1	190	133	111	35	117	9	0
211630-9	21.5	2.89	0.82	3508	4010	4.31	88	87	15	37	23	737	24	7	179	92	101	21	90	16	2
211630-9	22.5	2.89	0.70	3625	1765	4.09	87	116	14	46	27	194	22	4	180	99	97	33	94	12	3
211630-9	23.5	2.99	0.69	3745	1404	4.02	114	89	16	33	27	178	21	13	201	128	98	26	113	15	
211630-9	24.5	2.92	0.68	3511	1322	4.37	89	110	17	43	29	175	20	13	206	121	105	25	84	1	7
211630-9	25.5	2.86	1.00	3640	1385	4.94	133	118	18	45	31	167	20	1	239	127	118	33	111	5	1
211630-9	26.5	2.84	1.04	3552	1164	4.70	78	50	18	40	26	137	20	1	220	108	120	33	107	4	
211630-9	27.5	2.80	0.69	3773	1202	4.77	91	150	21	40	28	140	20	1	221	107	110	41	106	11	2
211630-9	28.5	2.88	0.65	3512	1437	4.99	132	94	24	46	24	107	22	5	223	123	101	34	110	3	5
211630-9	29.5	2.95	0.64	3676	1864	5.63	119	95	23	46	25	99	19	1	293	153	125	38	134	13	2
211630-9	30.5	2.93	0.58	3764	2039	5.03	108	82	21	43	26	100	20	1	245	133	106	34	121	10	2
211630-9	31.5	2.81	0.62	3605	2311	5.44	114	77	21	43	27	91	20	16	234	111	110	22	101	10	
211630-9	32.5	2.42	0.54	3058	1825	4.12	82	89	15	35	17	87	18	5	206	118	108	30	107	6	2
211630-9	33.5	2.82	0.80	3374	3385	5.28	55	90	18	43	27	94	20	13	251	119	136	33	103	12	3
211630-9	34.5	2.58	0.70	3471	5911	5.64	92	49	17	42	28	93	15	2	242	116	106	28	107	10	4
211630-9	35.5	2.55	0.63	3143	7796	5.51	68	114	24	46	23	90	20	25	246	147	114	32	112	9	9
211630-9	36.5	2.50	0.74	3046	5110	4.74	76	62	19	40	26	88	25	19	190	110	97	16	87	10	7
211630-9	37.5	2.88	0.60	3531	4015	5.44	95	71	18	53	36	100	20	1	239	114	103	20	97	12	6
211630-9	38.5	2.97	0.75	3577	6652	5.30	105	109	24	44	26	95	22	31	223	109	107	29	95	4	3
211630-9	39.5	2.96	0.89	3560	16253	5.49	101	108	16	30	19	84	17	4	225	129	117	19	99	9	8
211630-9	40.5	2.59	1.01	2974	13354	4.36	59	58	13	36	23	80	25	5	153	87	104	20	78	4	1
211630-9	41.5	2.80	0.78	3363	11105	5.30	76	50	21	47	38	97	18	9	253	121	127	31	101	5	13
211630-9	42.5	2.78	0.67	3387	6058	5.01	75	79	21	43	34	100	22	16	252	124	123	23	106	9	4
211630-9	43.5	2.70	1.39	3295	2951	4.29	68	66	17	40	32	89	20	3	225	97	143	24	82	10	4
211630-9	44.5	2.77	0.65	3409	2512	4.75	122	40	15	47	34	96	19	7	288	137	123	41	113	13	9
211630-9	45.5	2.73	0.62	3513	2376	5.08	112	92	21	45	31	93	19	14	274	122	116	28	97	13	5
211630-9	46.5	2.67	0.62	3426	2671	5.75	75	35	25	47	41	95	22	28	275	122	109	37	106	12	15
211630-9	47.5	2.49	0.67	3127	2719	5.37	100	80	16	43	34	90	19	18	248	85	78	28	82	7	3
211630-9	48.5	2.66	0.57	3451	1970	5.11	90	121	22	53	42	104	19	7	333	137	123	41	127	14	10
211630-9	49.5	2.52	0.63	3179	1877	4.86	101	87	20	47	39	94	19	4	283	119	102	29	98	6	6
211630-9	50.5	2.54	0.58	3394	1850	5.34	135	61	23	51	41	100	20	13	304	113	105	27	102	10	23
211630-9	51.5	2.68	0.57	3531	1389	4.77	120	57	17	52	39	104	22	1	300	117	103	40	113	11	13
211630-9	52.5	2.75	0.57	3444	1347	4.79	66	82	19	52	34	101	20	11	306	129	114	28	107	5	2
211630-9	53.5	2.63	0.63	3159	1181	3.90	97	58	8	42	24	89	23	17	212	88	76	15	82	7	6
211630-9	54.5	2.72	0.60	3527	1323	4.44	129	71	18	50	32	92	20	3	243	102	90	23	99	9	1
211630-9	55.5	2.52	0.58	3426	1119	4.44	61	74	22	43	35	93	21	19	268	125	108	20	108	0	

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	56.5	2.80	0.63	3646	1041	4.51	73	114	14	50	37	98	21	15	284	119	105	25	105	6	0
211630-9	57.5	2.77	1.03	3284	949	3.39	107	66	13	46	37	88	25	24	225	90	97	28	90	8	1
211630-9	58.5	2.80	0.64	3457	720	3.63	103	74	15	45	40	94	26	24	265	119	116	38	114	7	0
211630-9	59.5	2.75	0.69	3232	854	3.60	116	46	10	50	41	91	26	7	237	102	99	39	96	6	3
211630-9	60.5	2.52	0.64	3170	910	3.47	71	68	15	47	42	94	29	20	234	101	106	46	105	17	6
211630-9	61.5	2.97	0.66	3846	1299	4.63	125	93	20	57	36	102	24	25	298	121	104	33	106	7	
211630-9	62.5	2.76	0.63	3468	1476	4.84	80	43	21	47	33	94	23	26	290	115	102	30	114	8	3
211630-9	63.5	2.89	0.67	3666	1437	4.72	112	71	18	54	38	100	23	22	303	108	110	35	118	10	3
211630-9	64.5	2.96	0.64	3753	1242	4.66	90	77	21	54	36	107	21	21	288	130	108	24	112	6	4
211630-9	65.5	2.80	0.60	3522	1141	4.21	73	89	13	56	32	105	22	14	275	121	108	34	113	4	4
211630-9	66.5	2.96	0.72	3710	1065	4.13	146	85	15	50	38	102	24	15	249	109	100	32	101	12	10
211630-9	67.5	3.04	0.70	3806	922	4.47	127	53	17	53	35	101	21	4	275	122	108	26	113	10	1
211630-9	68.5	3.01	0.66	3762	1023	4.52	91	76	18	50	34	103	22	21	290	132	117	37	120	10	4
211630-9	69.5	2.94	0.84	3591	1226	4.50	142	73	16	46	24	97	23	24	235	115	99	25	103	11	0
211630-9	70.5	3.04	0.80	3631	1546	5.03	105	96	21	40	23	95	21	18	242	138	111	13	109	10	5
211630-9	71.5	3.01	0.66	3631	1767	4.87	118	77	21	46	26	95	19	10	238	112	108	32	100	7	
211630-9	72.5	3.05	0.58	3688	2009	5.25	147	72	22	45	28	97	22	13	244	128	104	30	112	12	5
211630-9	73.5	3.12	0.66	3812	1981	5.24	122	94	25	54	30	98	20	1	244	119	103	32	112	13	6
211630-9	74.5	2.89	0.70	3541	1890	4.69	119	126	19	38	23	87	22	18	195	99	93	24	86	3	4
211630-9	75.5	2.93	0.63	3527	1737	4.68	106	79	22	40	28	93	21	10	214	115	102	38	95	11	7
211630-9	76.5	2.81	0.63	3631	1821	5.03	113	116	21	44	34	98	22	1	247	133	98	25	112	9	5
211630-9	77.5	3.04	0.60	3850	1406	4.72	123	96	17	46	30	100	22	15	248	135	110	31	120	8	2
211630-9	78.5	3.15	0.66	4013	1408	4.73	137	110	19	49	34	103	20	4	271	141	123	40	122	9	11
211630-9	79.5	2.94	0.60	3803	1413	4.75	152	69	21	45	30	103	19	1	279	147	111	27	130	7	6
211630-9	80.5	3.00	0.67	3845	1608	4.83	95	142	21	43	26	94	20	1	249	138	115	27	118	9	3
211630-9	81.5	2.74	0.71	3662	1878	4.93	88	100	25	40	26	93	19	9	248	138	111	33	109	10	1
211630-9	82.5	2.88	0.76	3749	1483	4.32	131	110	12	47	31	97	21	1	256	147	123	32	116	13	3
211630-9	83.5	3.16	0.68	3923	1935	4.78	118	86	21	49	30	100	21	9	271	150	107	33	131	11	6
211630-9	84.5	2.88	0.82	3427	1721	4.56	77	92	24	40	24	90	19	16	233	148	114	28	111	14	0
211630-9	85.5	3.12	0.64	3745	2117	5.38	115	122	22	52	30	99	20	1	272	132	110	36	120	11	3
211630-9	86.5	2.91	0.70	3654	1910	5.02	149	77	21	50	30	95	21	15	238	134	95	18	102	8	2
211630-9	87.5	2.95	0.66	3768	1370	4.75	129	90	20	52	35	106	19	6	309	145	134	40	133	17	3
211630-9	88.5	2.95	0.79	3517	1679	4.67	101	83	13	46	31	100	22	10	253	124	112	28	110	7	
211630-9	89.5	2.65	0.97	2880	1418	3.62	49	84	12	34	23	78	22	9	154	78	70	19	82	6	
211630-9	90.5	2.87	0.64	3551	1506	4.55	97	108	15	43	28	96	22	1	235	133	112	27	113	17	
211630-9	91.5	3.02	0.64	3719	1593	4.77	87	93	18	48	32	99	19	1	278	140	116	34	129	13	6
211630-9	92.5	2.96	0.68	3629	1594	4.35	139	119	16	43	25	89	22	9	206	122	100	16	92	9	3
211630-9	93.5	2.69	0.69	3271	1664	4.41	126	95	12	41	24	88	20	1	232	130	99	31	105	8	
211630-9	94.5	2.80	0.66	3425	2277	5.16	82	115	21	48	35	91	18	7	248	130	118	39	124	17	3
211630-9	95.5	2.68	0.56	3439	2057	5.03	71	93	23	43	31	91	19	23	251	124	111	21	111	10	
211630-9	96.5	2.55	0.73	3098	1168	3.64	57	76	14	34	29	82	19	1	191	109	104	19	92	13	
211630-9	97.5	2.98	0.64	3767	1404	4.63	102	74	19	41	29	102	21	13	286	135	122	43	121	14	4
211630-9	98.5	2.85	0.66	3688	2088	5.04	128	78	20	43	27	101	22	11	281	125	107	37	120	11	2
211630-9	99.5	2.86	0.73	3484	2739	4.92	65	60	22	52	31	91	23	28	259	121	111	24	128	14	3
211630-9	100.5	2.83	0.71	3554	3174	5.42	116	86	22	41	26	98	21	35	287	139	115	36	117	9	3
211630-9	101.5	2.75	0.71	3461	3943	5.33	62	67	17	39	23	94	18	1	263	141	123	33	118	6	3
211630-9	102.5	2.74	0.78	3487	3592	5.16	75	100	19	44	31	96	18	1	269	142	130	38	119	14	6
211630-9	103.5	2.72	0.71	3598	2495	4.98	137	115	17	45	28	100	23	2	265	136	110	40	123	14	5
211630-9	104.5	2.96	0.68	3659	1956	4.92	78	91	21	48	35	97	21	1	294	131	107	42	124	6	

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	105.5	2.78	0.85	3381	1624	4.11	81	113	16	43	24	85	22	22	202	116	89	21	102	11	6
211630-9	106.5	3.02	1.07	3815	2019	4.79	108	117	22	52	32	100	21	8	295	133	123	40	125	8	0
211630-9	107.5	2.88	0.97	3758	1221	4.36	86	99	19	51	31	95	22	18	276	142	113	28	118	10	7
211630-9	108.5	2.98	0.62	3722	1389	4.79	115	81	20	47	34	102	20	8	291	147	123	44	134	11	1
211630-9	109.5	2.90	0.61	3556	1843	4.93	86	90	22	43	27	94	21	11	269	126	113	38	126	9	5
211630-9	110.5	2.58	0.69	3076	1981	4.45	64	83	15	38	23	86	19	1	229	131	111	34	105	10	7
211630-9	111.5	2.92	0.65	3679	2166	4.97	106	88	21	46	28	95	21	7	250	125	114	33	112	12	6
211630-9	112.5	2.90	0.67	3460	1738	4.34	98	71	18	46	29	94	21	8	223	123	98	24	104	13	
211630-9	113.5	2.84	0.64	3604	2684	5.21	106	110	24	48	33	100	21	16	264	135	100	32	126	15	4
211630-9	114.5	2.93	0.67	3668	2464	5.00	83	70	23	44	31	94	20	4	242	129	114	27	132	10	2
211630-9	115.5	2.83	0.67	3400	2189	4.56	100	78	19	46	24	91	24	10	218	109	111	31	101	10	4
211630-9	116.5	2.56	1.21	2618	1391	2.76	31	97	3	31	24	74	28	8	105	64	71	19	48	1	2

Core: 211660-6 1 m section (Gotland Basin)

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-6	50.5	2.64	3.43	2024	85793	6.00	0	13	5	21	41	93	16	19	87	99	155	25	77	7	55
211660-6	51.5	2.85	1.69	2882	46294	6.21	35	55	16	50	53	104	21	39	106	96	124	27	83	16	110
211660-6	52.5	2.96	1.42	3048	34736	5.63	53	96	15	41	50	102	20	41	101	135	140	37	95	15	80
211660-6	53.5	3.28	1.35	3242	27685	5.37	76	79	19	45	52	112	21	29	110	145	136	30	108	11	48
211660-6	54.5	2.34	2.01	2388	3939	2.65	116	57	8	29	48	76	22	14	65	76	72	16	50	7	19
211660-6	55.5	2.96	0.95	3196	16594	5.23	103	67	26	55	63	115	21	33	111	126	116	27	88	3	68
211660-6	56.5	2.90	1.20	2823	20242	4.98	85	27	16	49	56	102	20	10	101	96	108	28	75	5	82
211660-6	57.5	2.47	2.25	2180	71057	5.69	53	42	8	40	64	94	16	45	99	81	134	22	71	8	169
211660-6	58.5	2.72	3.00	2031	80245	5.25	2	21	4	39	61	103	17	37	102	88	165	26	75	10	121
211660-6	59.5	2.75	0.68	3021	10128	6.52	129	65	29	62	85	118	21	31	130	105	94	18	89	10	168
211660-6	60.5	3.03	0.58	3485	6008	6.48	108	59	30	65	79	123	21	9	152	128	105	25	101	9	138
211660-6	61.5	2.80	0.59	3310	5951	6.10	158	87	27	67	104	114	18	7	173	117	112	16	89	8	161
211660-6	62.5	2.70	1.16	3034	27423	5.20	84	45	13	61	94	113	22	24	160	91	94	18	73	11	143
211660-6	63.5	2.27	0.72	2588	7761	6.33	82	21	27	72	148	111	20	25	173	80	87	20	68	12	224
211660-6	64.5	2.27	0.76	2565	8086	5.36	78	56	22	71	146	113	20	4	157	70	93	23	57	3	197
211660-6	65.5	2.35	0.67	2684	6956	5.28	92	60	17	63	134	111	19	18	162	78	92	20	67	3	182
211660-6	66.5	1.82	0.59	2228	8513	6.26	86	42	17	67	130	130	17	9	178	80	90	18	60	6	234
211660-6	67.5	1.80	0.51	2080	6458	5.22	69	55	21	56	107	79	18	1	144	61	84	24	46	5	137
211660-6	68.5	1.60	0.60	1636	5875	4.05	66	30	13	49	90	98	16	1	139	42	66	11	46	5	128
211660-6	69.5	1.67	0.62	1737	6089	4.62	79	21	14	64	113	95	18	3	151	59	72	11	50	14	169
211660-6	70.5	2.29	0.59	2489	6889	7.14	86	19	25	64	107	100	20	22	130	73	79	19	61	3	198
211660-6	71.5	2.71	0.60	3341	5001	6.43	100	62	27	70	113	120	22	16	153	111	96	18	69	11	174
211660-6	72.5	2.50	1.17	2660	31359	6.64	109	24	17	54	92	104	17	19	161	103	100	21	75	15	189
211660-6	73.5	2.24	0.70	2531	8137	6.44	106	18	26	59	89	95	19	18	144	75	79	14	64	13	164
211660-6	74.5	1.46	0.85	1542	7987	3.52	31	25	10	43	91	79	21	12	119	36	61	2	27	0	112
211660-6	75.5	2.54	1.84	2397	51892	6.42	32	30	14	45	77	92	16	18	120	88	128	20	70	10	146
211660-6	76.5	2.38	0.90	2790	15520	5.25	119	63	17	59	84	92	19	3	146	79	94	11	68	11	132
211660-6	77.5	1.99	1.32	1697	39209	5.20	10	20	16	42	63	77	19	11	94	42	76	2	41	10	97
211660-6	78.5	2.75	1.61	2749	48181	5.25	31	27	8	44	49	96	20	29	112	98	124	23	77	8	92
211660-6	79.5	1.91	0.96	2104	8838	3.12	86	54	5	48	72	76	21	15	121	54	71	14	43	8	94

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-6	80.5	2.42	2.00	2232	67238	5.90	18	79	11	41	62	89	16	30	133	98	150	22	69	11	151
211660-6	81.5	2.67	1.58	2804	30298	6.36	47	60	22	53	68	88	17	15	112	91	101	16	69	5	110
211660-6	82.5	2.44	1.61	2126	50361	6.89	0	29	17	39	62	86	15	19	115	89	135	23	68	9	149
211660-6	83.5	2.31	1.53	2350	46626	5.59	69	51	11	43	59	99	18	29	126	80	122	24	64	9	157
211660-6	84.5	1.67	1.69	1092	50194	3.90	6	13	0	37	59	64	18	9	78	43	89	13	30	0	90
211660-6	85.5	2.05	2.58	1477	89047	5.92	0	41	7	31	51	83	16	32	96	61	155	23	64	10	99
211660-6	86.5	2.10	2.71	1475	93946	5.57	0	13		47	50	76	15	34	90	65	147	13	59	5	152
211660-6	87.5	1.95	1.93	1542	74750	4.78	0	14	1	42	62	79	12	13	108	70	146	21	54	4	105
211660-6	88.5	2.23	1.80	1928	41882	5.52	53	85	11	39	42	73	19	10	80	57	100	16	45	0	48
211660-6	89.5	2.57	1.64	2410	43995	5.75	51	21	13	44	48	93	21	19	108	118	137	27	88	6	69
211660-6	90.5	2.79	0.76	3172	12027	8.09	141	84	29	62	95	107	19	30	136	100	111	26	82	10	189
211660-6	91.5	2.94	1.41	3202	32905	6.73	93	92	22	55	77	104	17	21	118	120	134	22	81	7	90
211660-6	92.5	2.86	1.23	3051	24505	7.00	80	48	29	45	62	101	19	30	99	109	118	28	70	7	74
211660-6	93.5	2.61	0.75	2812	15699	9.35	119	30	26	39	67	93	16	26	109	95	103	17	76	12	106
211660-6	94.5	2.38	0.70	2712	6110	5.44	133	29	18	48	83	90	19	9	108	67	99	29	58	9	87
211660-6	95.5	2.01	1.02	2229	20298	4.95	93	13	11	42	84	85	19	17	112	52	89	8	41	10	90
211660-6	96.5	2.20	0.87	2505	14790	4.43	63	47	14	61	90	89	19	11	139	72	101	7	57	11	128
211660-6	97.5	2.07	0.69	2238	10486	4.65	82	32	20	54	86	86	18	3	132	83	89	16	55	9	160
211660-6	98.5	2.45	1.06	2741	17283	6.11	110	13	21	51	80	90	22	16	105	62	109	16	57	9	107
211660-6	99.5	1.99	1.08	1978	22319	5.55	0	39	18	49	76	80	17	17	114	54	86	13	44	6	167
211660-6	100.5	2.38	1.33	2438	34626	4.84	69	41	7	42	71	88	22	19	101	64	101	12	42	1	127
211660-6	101.5	1.31	0.90	1424	3065	2.32	34	47	4	35	56	69	24	7	107	30	79	3	22	0	90
211660-6	102.5	1.28	0.52	1318	4173	3.62	34	19	10	48	82	76	21	15	123	36	72	1	31	13	165
211660-6	103.5	2.62	0.77	3061	10487	6.79	101	54	25	53	87	101	19	17	131	101	96	17	83	12	122
211660-6	104.5	2.49	1.62	2511	38145	6.52	47	43	18	42	60	87	16	20	92	79	117	28	66	12	116
211660-6	105.5	2.60	2.02	2329	65635	5.64	48	24	2	42	68	89	15	32	121	94	145	25	71	10	156
211660-6	106.5	1.85	1.17	1926	23090	4.34	83	35	1	24	61	69	18	20	113	45	94	21	45	5	134
211660-6	107.5	1.95	2.13	1577	59081	6.03	0	30	6	27	42	65	18	21	79	41	120	4	43	11	84
211660-6	108.5	2.46	2.95	1934	85800	5.82	0	53	5	37	47	78	15	29	107	80	171	27	67	9	125
211660-6	109.5	2.46	2.95	1934	85800	5.82	36	45	3	34	51	80	18	32	87	82	154	11	68	9	61
211660-6	110.5	2.83	3.08	2275	71667	5.02	134	13	22	46	70	111	22	13	148	130	115	22	85	7	95
211660-6	111.5	2.44	3.13	1752	103336	5.79	0	13		28	40	74	15	46	93	55	175	25	69	18	122
211660-6	112.5	2.50	2.27	2002	70335	4.67	53	21	1	28	44	76	19	26	80	60	132	9	51	14	66
211660-6	113.5	2.60	3.05	1902	83597	5.54	0	13		30	43	76	17	37	88	77	179	18	72	9	69
211660-6	114.5	2.75	3.63	2027	84598	4.77	10	13		29	21	76	15	31	83	90	175	23	74	10	28
211660-6	115.5	2.95	2.52	2664	65208	5.41	63	19	6	36	41	82	18	27	90	101	163	23	76	13	30
211660-6	116.5	2.98	2.91	2493	85008	5.21	3	45	5	26	38	85	16	21	86	117	178	23	77	2	33
211660-6	117.5	2.83	2.63	2490	82087	6.02	7	13	4	29	36	83	16	15	87	97	172	21	70	6	44
211660-6	118.5	3.14	1.03	3579	19201	6.75	109	87	24	58	69	103	21	23	116	126	122	24	105	12	44
211660-6	119.5	3.34	1.93	3282	48399	5.22	97	62	10	41	48	97	20	22	96	136	156	37	93	14	20
211660-6	120.5	3.55	1.00	3634	19747	5.41	131	58	21	49	39	105	25	19	83	111	118	29	87	12	6
211660-6	121.5	3.50	0.80	3794	11347	5.34	141	97	23	57	44	106	23	16	86	124	127	26	92	9	6
211660-6	122.5	3.51	0.97	3708	14935	5.32	112	47	17	46	51	109	23	6	98	138	113	29	92	8	14
211660-6	123.5	3.29	1.08	3515	20675	5.69	94	91	19	47	60	102	21	24	95	117	107	24	80	18	37
211660-6	124.5	2.94	1.72	2881	42016	7.16	93	18	15	45	63	90	18	39	93	106	139	29	83	6	67
211660-6	125.5	3.54	1.07	3602	23727	5.91	120	84	21	51	54	102	20	31	87	151	129	29	85	7	30
211660-6	126.5	3.38	0.79	3659	11111	4.75	75	52	13	51	38	99	24	3	80	112	98	26	84	9	8
211660-6	127.5	3.44	0.81	3953	9900	4.96	131	104	19	53	52	113	23	15	114	167	123	26	101	7	10
211660-6	128.5	3.00	1.79	3195	40092	4.74	88	64	11	42	48	98	20	11	97	133	141	24	89	6	13

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-6	129.5	3.24	2.42	2790	57702	5.21	71	62	8	33	30	86	18	19	70	109	140	23	79	6	16
211660-6	130.5	3.44	1.04	3750	19630	6.30	135	86	23	49	55	110	18	13	121	155	148	32	107	15	35
211660-6	131.5	3.32	0.64	3895	4311	5.46	153	60	31	67	87	116	24	19	118	136	110	27	102	15	39
211660-6	132.5	3.17	1.77	2950	36081	6.25	79	32	25	57	77	105	20	45	106						
211660-6	133.5	3.14	1.56	3489	34866	6.58	108	72	27	49	57	102	20	37	102	129	153	25	103	13	34
211660-6	134.5	3.09	2.49	2486	65768	6.38	60	81	10	30	44	88	17	40	84	111	162	26	79	12	42
211660-6	135.5	3.17	1.70	3295	38640	6.06	99	22	14	42	56	99	18	18	104	144	143	28	92	6	30
211660-6	136.5	3.32	1.78	3179	41716	6.34	83	98	18	47	59	103	17	33	107	152	154	19	88	7	37
211660-6	137.5	2.94	2.26	2768	52965	7.25	105	94	17	40	49	91	18	28	92	115	147	28	88	13	65
211660-6	138.5	3.24	1.95	3163	40191	5.86	80	13	18	40	53	96	21	30	86	97	125	12	76	9	42
211660-6	139.5	3.27	1.87	3218	46925	6.15	67	44	13	42	47	95	19	37	100	128	143	27	87	7	51
211660-6	140.5	3.57	1.71	3464	37139	6.52	167	64	20	48	52	106	21	27	104	147	154	28	106	6	27
211660-6	141.5	2.94	2.38	2635	54661	7.40	59	47	20	42	55	89	17	26	94	107	145	23	86	11	50
211660-6	142.5	2.96	2.61	2507	61718	6.79	41	13	11	39	39	94	17	42	92	105	142	25	84	8	43
211660-6	143.5	3.15	1.89	2990	41540	5.75	82	75	17	45	64	93	16	26	88	107	131	19	70	9	46
211660-6	144.5	2.74	2.03	2563	44551	7.22	46	40	22	49	63	91	17	41	90	106	110	19	73	13	73
211660-6	145.5	2.80	3.05	2444	64120	6.98	80	37	17	32	46	82	17	48	87	99	177	21	83	5	57
211660-6	146.5	2.90	2.80	2619	62205	6.11	39	46	11	41	49	89	14	19	86	99	153	18	76	10	41
211660-6	147.2	2.38	3.03	1899	47325	2.82	0	19	0	29	24	67	25	13	32	29	89	11	35	1	4

Core: 211670-7 1-m section 7 (North Central Basin)

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211670-7	30.5	3.84	0.71	5092	1115	6.06	112	119	30	59	36	160	27	9	67	194	140	29	128	15	5
211670-7	31.5	3.81	0.73	4901	1101	5.91	105	124	30	48	37	159	26	9	66	192	140	37	116	13	5
211670-7	32.5	3.85	0.68	4922	1101	6.05	153	91	30	51	33	138	24	10	68	210	142	39	136	20	0
211670-7	33.5	4.09	0.76	5144	1083	6.04	160	95	23	50	30	134	28	12	53	169	132	30	101	9	0
211670-7	34.5	3.95	0.68	4802	1146	5.82	125	114	24	43	27	130	23	5	59	203	136	35	115	18	0
211670-7	35.5	3.79	0.69	5007	1864	6.13	135	112	29	51	35	135	26	13	74	207	150	42	130	18	8
211670-7	36.5	3.86	0.71	4947	2008	6.20	126	140	25	51	29	127	25	12	67	190	129	34	119	20	7
211670-7	37.5	3.79	0.70	4862	1230	6.04	138	150	31	50	27	119	26	14	57	168	129	32	108	19	4
211670-7	38.5	3.77	0.69	4739	1093	6.16	154	88	31	53	37	129	23	7	70	210	144	40	139	20	5
211670-7	39.5	3.77	0.69	4739	1093	6.16	139	68	24	45	28	116	24	8	54	169	130	28	105	11	3
211670-7	40.5	3.85	0.68	4800	1004	5.70	123	104	28	45	28	124	23	21	51	163	118	27	99	18	4
211670-7	41.5	3.51	0.66	4458	978	5.53	111	89	31	41	33	122	29	11	56	192	129	43	126	15	5
211670-7	42.5	3.74	0.69	4734	1085	5.82	144	106	29	48	32	131	25	4	63	205	139	40	132	20	3
211670-7	43.5	3.64	0.64	4801	1141	5.62	182	139	26	48	26	125	24	11	62	210	134	39	124	14	1
211670-7	44.5	3.65	0.65	4666	1083	5.81	139	78	30	51	37	133	27	22	70	197	135	37	134	24	1
211670-7	45.5	3.70	0.64	4862	994	5.42	212	106	26	55	33	127	26	15	62	190	132	32	129	16	0
211670-7	46.5	3.53	0.67	4722	1000	5.50	146	131	26	49	32	126	23	13	61	175	123	36	125	16	4
211670-7	47.5	3.51	0.64	4631	1032	5.50	97	84	25	49	32	131	24	4	67	191	131	33	134	15	5
211670-7	48.5	3.55	0.66	4798	1061	5.65	95	97	28	43	30	132	23	16	70	197	132	42	135	18	0
211670-7	49.5	3.61	0.65	4617	1318	5.36	120	110	22	46	29	127	23	1	58	163	129	36	112	8	0
211670-7	50.5	3.70	0.72	4742	2442	6.39	126	81	29	46	30	130	25	15	67	211	149	46	132	12	8
211670-7	51.5	3.73	0.73	4748	1353	6.83	140	100	32	46	28	129	25	13	77	201	142	37	130	13	12
211670-7	52.5	3.81	0.67	4545	1280	6.67	110	118	30	50	31	128	25	13	62	177	126	35	115	11	11

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211670-7	53.5	3.66	0.70	4675	1274	6.42	140	87	33	45	30	121	26	6	64	177	149	40	129	13	9
211670-7	54.5	3.71	0.69	4801	1223	5.88	164	126	25	46	33	130	24	13	68	197	145	35	135	15	6
211670-7	55.5	3.77	0.70	4858	1174	5.70	104	128	26	45	32	124	27	1	61	176	130	28	119	11	1
211670-7	56.5	3.79	0.74	4912	1193	5.85	148	113	28	49	31	129	26	12	62	175	133	45	135	15	5
211670-7	57.5	3.76	0.66	4927	1191	5.96	143	134	25	49	30	130	25	8	69	204	154	42	127	13	4
211670-7	58.5	3.93	0.71	4834	1273	6.23	105	111	27	53	30	125	25	5	65	204	133	29	121	17	7
211670-7	59.5	3.88	0.70	4993	1264	5.97	137	150	29	50	33	131	27	15	66	201	144	33	127	14	2
211670-7	60.5	3.79	0.63	4750	1320	6.00	136	72	27	53	37	136	24	1	72	206	144	44	133	14	3
211670-7	61.5	3.79	0.64	4718	1495	6.53	142	118	28	48	29	131	22	15	74	196	137	35	135	13	14
211670-7	62.5	3.84	0.69	4856	1484	6.43	152	108	29	48	25	120	23	16	56	176	129	32	105	16	8
211670-7	63.5	3.50	0.65	4710	1514	6.07	174	150	30	47	31	124	26	12	70	200	146	34	129	12	5
211670-7	64.5	3.77	0.71	4704	1694	6.38	172	127	31	46	29	130	24	5	70	202	142	47	127	18	13
211670-7	65.5	3.70	0.72	4644	1414	5.76	108	89	30	52	38	133	28	6	70	207	148	41	134	17	4
211670-7	66.5	3.73	0.69	4748	1283	5.87	134	146	29	55	35	128	25	12	66	189	133	26	116	11	4
211670-7	67.5	3.71	0.68	4779	1179	5.66	135	113	26	46	27	129	25	7	69	195	132	53	134	19	2
211670-7	68.5	3.80	0.65	4544	1041	5.35	92	93	24	46	26	120	23	17	57	174	126	33	116	19	2
211670-7	69.5	3.58	0.67	4797	1113	5.68	164	95	28	46	35	130	24	7	70	203	148	41	135	16	7
211670-7	70.5	3.71	0.73	4818	1306	5.78	154	123	26	57	35	136	24	22	81	208	141	39	130	15	9
211670-7	71.5	3.76	0.72	4690	1545	5.94	108	97	28	53	37	135	25	5	78	180	146	38	112	9	12
211670-7	72.5	3.82	0.69	4703	1571	6.22	102	98	29	53	40	134	27	2	71	172	136	31	115	11	13
211670-7	73.5	3.73	0.70	4662	1571	6.45	137	91	30	50	31	131	24	16	76	215	136	44	125	15	15
211670-7	74.5	3.80	0.70	4552	1853	6.43	115	101	32	56	38	134	25	15	78	202	139	37	124	15	14
211670-7	75.5	3.79	0.70	4718	1707	6.49	124	108	30	45	33	132	23	14	73	189	140	27	112	13	12
211670-7	76.5	3.53	0.68	4712	1846	6.71	132	104	36	47	29	131	23	7	78	185	135	30	127	15	12
211670-7	77.5	3.66	0.67	4721	1474	5.97	171	125	31	51	38	134	27	12	71	195	141	28	113	15	9
211670-7	78.5	3.67	0.72	4700	1486	5.99	151	122	31	54	36	131	28	14	65	190	136	42	131	21	14
211670-7	79.5	3.66	0.68	4704	1505	6.67	120	142	28	43	33	127	24	14	71	164	128	27	102	11	7
211670-7	80.5						150	119	30	49	26	125	26	7	68	188	132	38	130	15	9
211670-7	81.5	3.59	0.67	4603	1419	6.64	178	117	29	52	28	121	24	12	67	199	137	32	121	16	11
211670-7	82.5	3.88	0.68	5051	1516	6.45	115	111	34	50	37	127	26	22	73	181	123	32	127	13	8
211670-7	83.5	3.67	0.67	4620	1376	5.81	124	95	30	57	33	123	24	27	69	188	138	34	116	12	0
211670-7	84.5	3.67	0.66	4507	1360	5.93	122	119	27	51	33	121	22	2	72	175	137	35	113	12	5
211670-7	85.5	3.76	0.68	4505	1298	5.79	107	91	28	46	34	127	22	4	88	176	138	33	106	8	7
211670-7	86.5	3.62	0.65	4593	1225	5.73	124	120	27	44	33	128	24	16	82	194	145	32	124	15	7
211670-7	87.5	3.47	0.62	4465	1180	5.66	132	125	22	53	31	126	27	5	69	195	138	35	126	14	4
211670-7	88.5	3.40	0.63	4441	1088	5.31	146	105	28	48	29	124	25	19	73	158	120	30	106	14	4
211670-7	89.5	3.40	0.63	4441	1088	5.31	164	121	27	43	34	138	24	5	84	191	137	41	115	14	12
211670-7	90.5	3.52	0.64	4396	1062	5.10	128	109	28	44	36	132	25	5	82	169	133	40	128	18	12
211670-7	91.5	3.73	0.68	4678	1043	5.94	158	114	31	40	33	133	22	13	98	178	133	32	119	18	16
211670-7	92.5	3.69	0.67	4455	952	5.95	149	122	37	51	36	139	23	22	110	178	124	32	119	11	16
211670-7	93.5	3.48	0.65	4360	892	7.19	190	92	29	40	33	133	19	4	98	168	135	32	119	12	28
211670-7	94.5	3.44	0.66	4 424	848	6.25	120	57	31	52	37	139	23	22	110	185	145	37	134	17	28
211670-7	95.5	3.59	0.68	4610	820	6.29	116	68	32	44	38	134	18	4	100	178	123	29	118	16	19
211670-7	96.5	3.34	0.63	4143	800	6.83	192	66	31	53	57	138	23	11	123	160	121	33	117	16	49
211670-7	97.5	2.95	0.60	3805	1312	8.08	116	72	32	61	84	140	17	9	157	145	122	38	98	14	120
211670-7	98.5	3.20	0.66	4257	1403	7.08	193	112	33	56	59	147	18	11	141	161	126	32	117	10	70
211670-7	99.5	3.44	0.75	4369	1691	7.44	213	76	41	62	61	143	21	14	140	164	138	38	124	11	75
211670-7	100.5	3.51	0.72	4699	1212	6.19	191	111	29	58	44	136	23	27	113	173	126	37	127	18	24
211670-7	101.5	3.45	0.69	4485	1167	5.83	192	76	28	45	42	130	22	15	120	168	129	34	112	11	13

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211670-7	102.5	3.47	0.73	4435	1236	6.30	200	70	31	60	45	131	23	25	118	150	124	32	114	9	18
211670-7	103.5	3.45	0.72	4488	1065	5.86	183	100	28	59	55	136	22	2	122	172	130	33	121	13	11
211670-7	104.5	3.51	0.73	4395	1223	6.17	170	109	30	65	62	143	21	21	131	168	134	29	117	14	11
211670-7	105.5	3.43	0.68	4491	1119	7.07	162	99	35	45	31	127	23	23	81	193	132	37	123	14	13
211670-7	106.5	3.68	0.67	4630	1004	6.18	150	90	29	46	37	128	24	5	82	177	143	36	122	15	8
211670-7	107.5	3.45	0.68	4676	982	5.78	95	92	27	58	39	130	22	9	82	178	136	39	119	16	2
211670-7	108.5	3.61	0.71	4725	1026	5.78	146	131	25	49	42	133	22	10	82	180	130	30	117	11	5
211670-7	109.5	3.70	0.69	4676	965	5.65	131	116	30	47	43	130	26	16	85	183	142	36	114	16	7
211670-7	110.5	3.76	0.67	4808	910	6.46	141	137	32	52	43	133	23	16	95	195	150	46	127	16	9
211670-7	111.5	3.65	0.69	4704	898	6.42	196	110	32	53	43	134	22	8	92	180	138	39	119	8	11
211670-7	112.5	3.65	0.68	4548	964	6.47	166	124	26	57	44	136	21	22	111	185	146	39	124	12	5
211670-7	113.5	3.53	0.70	4464	1006	6.63	153	65	34	56	54	138	22	20	120	169	131	37	123	11	10
211670-7	114.5	3.49	0.68	4563	1039	6.56	168	121	27	57	54	137	23	15	121	179	129	46	129	19	16
211670-7	115.5	3.43	0.68	4496	987	6.44	178	86	25	49	53	129	23	29	113	169	136	29	117	18	15
211670-7	116.5	3.44	0.68	4483	1037	6.49	166	96	30	56	47	127	24	11	99	168	130	41	120	9	8
211670-7	117.5	3.54	0.68	4678	988	6.64	205	73	28	42	31	124	20	9	74	182	139	37	114	15	6
211670-7	118.5	3.73	0.71	4880	978	6.38	172	96	33	45	34	125	25	9	74	184	131	42	124	17	5
211670-7	119.5	3.73	0.70	4928	1026	6.04	186	103	27	48	42	137	21	5	95	195	155	37	133	24	5
211670-7	120.5	3.83	0.73	4848	1091	6.27	128	63	34	52	49	139	27	13	91	193	144	35	124	18	2
211670-7	121.5	3.80	0.73	4893	1057	6.30	167	96	26	54	40	136	24	14	78	201	140	42	127	13	1
211670-7	122.5	3.84	0.77	4765	959	6.07	166	132	28	48	38	121	24	7	58	166	122	33	105	8	2
211670-7	123.5	3.76	0.71	4883	976	6.69	167	125	36	45	40	127	22	21	67	201	136	33	131	21	4
211670-7	124.3	3.52	0.72	4743	1099	6.51	157	127	29	46	40	119	26	14	56	144	107	22	97	15	0

Appendix D

EDX Results of cores (calibrated against intern. geological reference materials)

Core: 211630-9 Bornholm Basin Samples from paleomag. measurements

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	10.3	2.95	0.59	4066	2143	5.70	111	101	24	47	34	108	19	12	261	128	115	28	115	12	
211630-9	15.6	3.17	0.61	4322	2040	5.59	169	95	23	37	26	104	20		240	126	121	25	123	10	2
211630-9	19.0	3.21	0.64	3910	3567	5.22	80	74	19	52	33	106	22	15	237	129	104	28	110	8	2
211630-9	24.0	3.12	0.58	3934	1627	5.33	119	113	23	42	30	109	22	4	246	124	110	34	113	3	5
211630-9	26.7	3.02	0.54	4009	1258	5.15	123	75	26	50	32	114	24	10	258	127	111	35	115	7	5
211630-9	29.7	2.96	0.56	3570	1710	5.47	115	90	27	51	31	106	23	19	254	133	117	22	120	12	
211630-9	32.6	3.17	0.59	4030	1602	5.33	141	89	26	49	33	108	25	22	258	124	100	24	101	5	2
211630-9	38.0	2.83	0.73	3202	9985	5.06	97	67	19	50	33	105	21	17	245	115	112	36	117	8	8
211630-9	45.7	3.12	0.64	3791	1510	4.97	113	88	25	52	28	106	21	3	251	142	107	29	113	9	4
211630-9	48.1	2.82	0.54	3499	2856	6.20	126	108	24	55	30	109	20	7	261	122	110	38	112	15	15
211630-9	52.7	2.67	0.51	3635	2385	6.11	130	129	29	41	24	101	18	10	273	134	111	38	116	14	18
211630-9	54.9	2.84	0.57	3631	1670	5.36	100	110	18	42	28	95	21	5	297	124	101	34	111	13	32
211630-9	57.0	2.90	0.56	3806	1422	5.31	101	140	21	46	28	98	20	26	232	143	113	29	129	11	8
211630-9	61.4	3.01	0.67	3846	1572	5.45	140	104	9	33	17	96	18	2	237	132	119	27	122	6	1
211630-9	63.4	2.78	0.65	3753	1456	4.99	103	171	25	46	40	107	23	30	265	126	110	24	119	14	6
211630-9	65.3	2.85	0.71	3722	1389	4.96	122	113	26	48	33	106	20	15	275	132	117	36	117	11	4
211630-9	69.3	2.86	0.72	3807	1125	4.55	84	140	24	48	31	107	21	10	260	138	124	41	122	9	0
211630-9	71.3	3.02	0.61	3639	1010	4.66	119	135	17	46	29	99	20	12	219	140	104	38	118	9	6
211630-9	76.3	2.98	0.55	3913	1747	5.18	112	89	22	46	28	101	19	13	258	143	108	34	120	7	5
211630-9	78.7	2.92	0.60	3705	1611	5.03	109	88	21	45	32	98	20	15	241	140	117	32	116	7	10
211630-9	80.5	3.42	0.69	4356	1670	5.60	149	98	18	53	25	98	19	2	257	151	123	43	144	13	3
211630-9	84.5	1.79	1.86	1721	789	1.98	4	30	17	53	32	104	19	11	244	64	80	22	81	6	5
211630-9	86.4	3.23	0.71	3949	1550	4.88	110	116	21	44	29	104	18	17	237	142	112	36	134	7	1
211630-9	88.4	2.94	0.61	3636	1847	4.86	130	102	21	48	28	106	20	22	233	156	111	41	141	13	3
211630-9	90.6	3.04	0.83	3741	1885	5.28	139	96	26	53	27	101	17	10	232	120	150	29	109	3	
211630-9	93.0	2.90	1.32	3650	2182	5.07	142	98	21	50	28	106	21		211	141	124	29	121	16	6
211630-9	97.4	2.86	0.62	3602	2287	5.22	105	96	22	52	34	105	20	3	256	113	105	29	112	11	
211630-9	100.3	2.97	0.60	3541	3364	5.93	118	47	24	52	37	114	21	7	250	127	112	28	105	9	
211630-9	102.5	2.93	0.69	3608	2617	5.70	119	111	21	50	34	107	20	6	215	134	118	50	112	6	8
211630-9	104.6	3.15	0.77	3904	2352	5.51	154	106	28	53	34	110	19	12	261	140	126	46	144	7	2
211630-9	108.5	3.00	0.66	3784	2785	5.45	103	99	24	55	33	114	20	3	254	143	119	27	122	10	
211630-9	110.9	3.15	0.64	3948	1257	4.83	130	153	20	48	32	107	20	6	242	139	111	49	131	8	1
211630-9	112.6	3.12	0.66	4144	2350	5.75	109	114	20	47	35	111	22	18	252	147	116	38	134	8	3
211630-9	114.7	3.22	0.74	3927	2083	5.28	161	113	21	52	33	105	20	15	236	132	117	35	119	8	
211630-9	118.4	3.04	0.65	3926	2985	5.54	131	106	18	40	26	99	20	19	227	133	108	29	118	12	3
211630-9	120.3	3.07	0.64	3872	2517	5.30	107	70	26	54	35	112	21	11	271	139	121	34	133	13	2
211630-9	122.3	2.97	0.62	3799	2210	5.16	105	94	23	48	36	110	19	11	249	143	119	44	119	3	1
211630-9	124.4	2.93	0.64	3905	2551	5.22	162	105	20	57	35	111	20		259	134	111	41	130	13	2
211630-9	126.3	3.05	0.67	3882	4327	5.45	109	125	18	57	29	107	19	8	246	136	113	32	116	7	7

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	128.3	2.54	0.60	3052	4352	4.42	54	64	24	54	32	105	18	30	260	131	113	35	125	13	6
211630-9	132.5	3.17	0.67	3979	6422	5.28	76	94	16	48	30	105	18	18	271	149	112	30	124	11	8
211630-9	134.0	3.06	0.75	3822	7219	5.05	102	112	17	49	29	115	21	20	262	140	128	36	131	16	4
211630-9	136.4	2.54	0.76	2575	6675	3.39	63	47	25	44	27	110	22	21	279	105	102	34	107	8	2
211630-9	141.8	3.08	0.74	3900	7335	5.45	117	87	24	47	34	108	19	12	262	154	127	32	133	5	3
211630-9	143.2	3.14	0.72	4044	6285	5.43	109	102	23	37	26	104	20		240	156	119	30	127	7	0
211630-9	145.2	3.19	0.69	3992	3347	5.67	106	114	19	52	33	107	22	15	238	156	128	37	127	10	5
211630-9	147.3	3.04	0.64	4248	2849	5.57	118	121	23	42	31	110	22	4	247	161	125	45	136	11	11
211630-9	149.3	3.25	0.69	4192	3412	5.01	108	123	26	50	32	114	24	10	258	169	138	35	141	9	3
211630-9	152.8	3.13	0.66	3869	3495	5.36	116	73	27	52	31	106	23	19	255	149	132	36	134	7	5
211630-9	158.0	3.15	0.71	3930	4382	5.57	111	90	27	49	33	109	25	22	259	154	131	41	132	12	
211630-9	160.5	3.25	0.72	4049	2677	5.17	104	130	19	50	33	105	21	17	245	154	118	38	121	14	5
211630-9	167.6	3.13	0.69	4079	2727	5.32	104	112	25	52	28	106	21	3	252	155	121	43	139	8	1
211630-9	169.8	3.13	0.88	4036	3942	5.58	97	121	24	55	30	109	20	7	260	145	136	41	122	9	1
211630-9	171.4	2.97	0.66	3746	4261	5.96	71	98	29	41	24	102	18	10	273	159	117	39	131	10	6
211630-9	173.3	2.79	0.76	3558	6763	5.09	74	54	18	42	28	94	21	5	297	137	114	31	131	12	3
211630-9	178.0	2.98	0.84	3641	14959	5.64	97	86	21	46	28	98	20	26	232	129	109	32	123	8	4
211630-9	179.7	2.77	0.81	3482	14834	5.29	77	69	9	33	17	96	18	2	237	120	120	34	118	10	3
211630-9	183.4	3.11	0.70	3990	2790	5.30	110	107	25	46	41	107	23	30	266	157	129	36	134	4	3
211630-9	186.0	3.19	0.74	3893	5308	5.36	95	64	24	48	32	108	21	10	261	154	117	44	129	5	4
211630-9	187.5	2.71	0.65	3433	3744	4.34	77	39	17	46	28	99	20	12	219	156	120	47	133	11	3
211630-9	189.1	2.91	0.76	3831	8531	5.30	139	161	22	46	29	101	19	13	258	134	132	32	129	10	10
211630-9	190.7	3.04	0.86	3791	9031	4.96	49	64	21	45	32	98	20	15	241	155	121	42	139	7	1
211630-9	192.6	2.97	0.94	3672	9912	5.47	126	71	18	53	25	98	19	2	257	149	143	39	137	10	5
211630-9	196.2	3.10	0.73	4006	7798	5.84	106	113	18	54	33	106	20	11	247	167	127	34	136	17	17
211630-9	197.9	3.03	0.83	3845	9647	5.87	94	102	21	44	29	104	18	17	237	155	144	39	136	13	20
211630-9	199.8	3.01	0.68	3955	3679	5.34	79	99	21	48	28	106	20	22	233	142	131	43	131	13	7
211630-9	201.8	3.07	0.76	3876	6225	5.90	104	115	26	53	27	101	17	10	233	136	126	37	140	17	9
211630-9	203.4	3.19	0.80	3837	6640	4.99	114	92	21	50	28	107	21		211	163	141	41	135	15	6
211630-9	205.9	3.10	0.83	4143	6280	5.13	92	95	22	52	35	105	20	3	257	153	132	44	139	12	7
211630-9	208.9	3.44	0.73	4312	3973	5.96	125	76	24	52	37	114	21	7	251	155	123	34	137	13	6
211630-9	212.2	3.07	0.65	4031	3148	5.16	125	86	21	50	34	107	20	6	215	138	109	33	130	8	
211630-9	213.8	3.09	0.69	4068	3264	5.34	126	120	28	53	34	110	19	12	261	168	133	40	147	20	4
211630-9	215.5	3.34	0.70	4201	2151	5.13	75	79	24	55	33	114	20	3	254	175	123	28	141	15	5
211630-9	220.6	3.26	0.85	4003	6074	5.57	80	110	21	48	32	107	20	6	242	152	116	37	137	10	7
211630-9	222.3	3.10	0.80	4035	7435	4.95	92	107	20	47	35	110	22	18	251	154	129	41	140	5	
211630-9	223.8	3.34	0.92	3948	12354	5.34	78	82	21	52	33	105	20	15	237	140	125	37	139	10	
211630-9	225.7	2.97	0.80	3688	9595	5.13	94	80	18	40	27	99	20	19	227	156	124	32	124	15	5
211630-9	227.1	3.20	0.61	4125	2253	5.10	144	117	26	54	35	112	21	11	271	154	124	35	146	20	1
211630-9	228.4	2.98	0.62	3873	3457	5.35	111	92	23	48	36	110	19	12	249	139	115	35	131	10	4
211630-9	233.1	3.08	0.63	3959	2794	5.25	128	101	20	57	35	111	20		259	161	129	33	135	13	10
211630-9	234.5	3.00	0.70	3747	3747	5.45	120	86	18	57	29	107	19	8	246	154	121	37	132	12	8
211630-9	236.0	3.23	0.81	3876	7013	5.47	145	70	24	54	32	105	18	30	261	146	121	49	136	13	9
211630-9	239.0	3.09	0.71	3965	4745	5.24	84	80	16	48	30	105	18	18	272	163	124	42	138	13	3
211630-9	240.6	3.20	0.75	4098	4266	5.18	116	100	17	49	29	115	21	20	262	154	126	31	129	8	3
211630-9	244.0	3.12	0.68	4187	2638	5.53	115	146	25	44	28	110	22	21	281	168	133	35	149	15	8
211630-9	245.9	3.05	0.76	4083	3477	5.54	128	88	26	48	33	106	20	15	275	160	129	47	143	16	4
211630-9	249.8	3.07	0.69	3857	2211	5.13	135	90	21	51	38	112	20	5	286	159	124	31	137	10	11
211630-9	253.3	3.09	0.80	3881	3380	4.97	122	131	21	47	32	106	23	23	244	144	127	42	127	10	

Core	Depth	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Ga	As	Br	Rb	Sr	Y	Zr	Nb	Mo
	cm	(%)	(%)	mg/kg	mg/kg	(%)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
211630-9	254.7	3.07	0.70	3977	4586	5.34	86	116	21	52	30	108	21	5	268	154	128	42	142	13	6
211630-9	256.1	3.15	0.75	4107	3517	5.03	127	80	13	53	34	113	21	9	278	172	130	44	140	5	2
211630-9	257.5	3.03	0.77	4098	2995	4.87	101	120	23	54	35	109	21	5	264	173	126	39	158	15	3
211630-9	260.8	3.20	0.74	4142	3565	5.41	107	101	23	55	31	111	20	9	259	154	126	46	143	6	5
211630-9	262.3	3.39	0.73	4240	2570	5.21	135	133	24	54	34	116	22	10	270	162	132	45	150	16	6
211630-9	263.8	3.34	0.73	4166	2468	5.06	116	119	19	50	35	111	22	20	258	163	124	46	143	13	8
211630-9	267.7	3.34	0.77	4353	3999	5.70	128	102	21	46	35	115	22	12	270	163	132	40	132	8	11
211630-9	270.5	3.11	0.85	3895	9390	5.25	105	108	24	46	33	106	17	11	242	162	121	33	136	15	5
211630-9	272.1	3.08	0.74	3822	4842	5.33	63	76	27	56	36	107	22	7	258	132	117	39	130	13	2
211630-9	274.0	2.96	0.70	3932	3360	5.21	102	134	23	47	30	105	19	4	271	156	121	45	139	9	2
211630-9	275.7	3.13	0.75	3846	3213	5.12	89	92	24	58	35	109	19	14	258	162	119	34	136	13	18
211630-9	275.8	3.11	0.71	3848	4573	5.26	140	109	20	48	27	108	20	6	253	165	140	42	140	14	14
211630-9	278.3	3.18	0.84	3933	4740	4.73	93	102	19	53	38	111	19	2	250	163	124	40	145	14	9
211630-9	280.9	3.00	0.77	3764	5936	5.13	76	97	25	46	28	101	19	12	227	171	127	30	135	12	14
211630-9	284.4	3.08	0.78	3854	7496	5.08	121	120	20	52	32	105	20	10	234	157	119	39	146	18	8
211630-9	287.8	3.18	0.73	4136	3723	5.36	105	96	27	54	36	117	21	23	257	151	116	34	131	14	8
211630-9	290.2	3.16	0.79	4143	6401	5.34	134	110	26	52	37	112	21	14	247	157	135	34	127	15	10
211630-9	292.8	3.36	0.65	4003	1981	5.15	127	97	21	57	37	115	22	11	262	151	124	36	139	16	7
211630-9	295.3	3.28	0.71	3987	4836	5.49	109	94	24	52	32	111	18	0	250	158	118	41	137	12	12
211630-9	300.2	3.20	0.74	3908	2904	4.90	75	100	26	50	35	112	20	12	268	155	122	44	132	8	10
211630-9	302.2	3.19	0.69	4092	3613	4.87	124	121	24	54	34	112	18	8	248	165	131	45	135	14	5
211630-9	307.2	3.26	0.78	4042	5572	5.31	129	79	24	60	34	110	22	11	248	161	122	37	144	14	4
211630-9	310.0	3.14	0.71	4100	5199	5.47	107	112	22	56	33	108	21	14	249	173	121	40	145	12	3
211630-9	315.5	3.26	0.72	4052	4317	5.62	70	70	29	52	29	112	22	39	220	164	120	41	148	19	4
211630-9	319.0	3.25	0.72	4058	4578	5.39	97	82	26	50	33	110	22	19	214	156	134	37	134	13	8
211630-9	322.4	3.21	0.89	3989	10681	5.37	80	89	21	54	35	107	22	14	217	159	133	37	142	15	2
211630-9	324.0	3.23	0.74	4166	4041	5.04	109	93	20	52	32	110	19	2	224	137	110	38	129	12	1
211630-9	324.7	3.19	0.77	3985	4746	5.14	130	90	17	54	32	108	21	5	236	148	112	30	132	11	6
211630-9	325.7	3.24	0.71	4170	3889	4.77	96	174	21	52	32	116	23	16	238	155	121	44	144	18	
211630-9	327.7	3.48	0.82	4423	3555	5.06	136	100	22	55	33	115	20	1	262	154	126	31	136	17	3
211630-9	332.1	3.13	0.74	3870	3589	4.83	90	90	24	50	35	110	23	6	224	159	126	37	138	10	
211630-9	345.0	2.83	0.64	3362	3297	4.42	100	58	21	42	28	98	24	9	184	165	118	37	137	14	
211630-9	347.6	3.29	0.70	4406	3192	5.26	165	113	23	49	34	115	21	3	217	147	135	40	139	13	3
211630-9	354.4	3.28	0.96	3913	14247	5.06	82	107	14	51	27	104	21	10	196	162	129	38	147	13	9
211630-9	356.1	3.19	0.72	4007	5442	5.14	111	124	25	43	27	110	20		217	163	132	32	135	12	1
211630-9	358.7	3.03	0.76	3697	7969	4.67	128	93	21	41	32	106	26	9	187	165	121	38	135	10	6
211630-9	360.4	3.30	0.93	4123	11733	5.28	81	92	11	35	19	106	20	25	201	179	120	28	142	16	1
211630-9	361.9	3.27	0.74	4195	4351	5.28	97	98	26	54	39	114	22	8	225	172	125	30	132	11	3
211630-9	365.5	3.37	0.84	4222	1723	4.82	98	101	22	45	34	111	23	7	217	142	124	34	128	16	
211630-9	367.1	3.43	0.73	4215	1717	4.94	110	130	26	55	33	113	21	7	219	171	125	52	152	19	5
211630-9	368.7	3.30	0.74	4270	2062	5.22	122	56	18	40	28	110	21	13	229	163	136	43	139	11	4
211630-9	371.9	3.35	0.68	4182	2833	5.09	91	80	24	52	35	114	21		215	158	114	46	139	15	6
211630-9	373.6	3.32	0.73	4119	1872	4.84	118	109	24	59	35	110	21	6	201	156	134	39	137	15	2
211630-9	375.3	3.31	0.75	4264	2148	5.18	98	118	22	57	33	116	24	26	238	163	137	36	133	13	3
211630-9	376.6	3.33	0.73	4510	2344	5.27	151	111	25	55	32	112	19	24	245	146	124	29	124	14	8
211630-9	380.1	3.33	0.72	4109	1876	5.03	101	85	22	53	33	113	20	7	233	156	119	35	137	11	9
211630-9	385.1	3.22	0.91	4007	7750	5.21	79	133	20	50	33	107	20	1	239	133	116	42	133	12	9
211630-9	386.4	3.23	0.95	4052	8229	5.11	95	96	21	48	29	107	20	12	228	161	134	46	132	20	6
211630-9	390.9	3.33	0.85	4186	2850	5.30	128	108	25	62	37	111	21	6	251	158	118	53	132	14	

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211630-9	393.6	3.16	0.71	4087	2687	5.18	129	96	23	60	29	108	20	9	252	163	129	41	132	11	7
211630-9	396.0	3.38	0.73	4202	1904	5.00	116	120	25	48	34	107	21	12	232	149	139	27	127	6	4
211630-9	398.8	3.29	0.71	4071	1812	4.90	93	106	21	59	34	108	21	3	245	153	128	38	135	17	9
211630-9	403.5	3.28	0.76	4038	1981	5.08	115	107	27	58	32	109	23	27	228	153	121	36	124	9	3
211630-9	405.9	3.04	0.69	3963	2349	5.26	147	116	22	51	31	109	20	21	235	170	127	42	150	18	15
211630-9	408.7	3.31	0.77	4281	2118	5.24	121	125	22	47	32	111	21	8	219	167	127	48	148	15	5
211630-9	411.4	3.23	0.76	4131	1834	5.21	113	116	23	47	31	107	21	6	246	149	126	24	139	16	10
211630-9	416.5	3.20	0.74	4034	1533	5.05	130	111	23	55	34	108	21	25	274	174	122	39	137	16	2
211630-9	418.9	3.40	0.77	4172	2069	5.16	108	111	24	53	35	111	20	12	279	170	133	44	140	12	3
211630-9	420.5	3.35	0.76	4151	1699	4.98	131	128	22	54	38	111	22	15	267	172	133	43	138	14	6
211630-9	425.7	3.26	0.82	4048	2597	5.25	71	90	25	58	37	113	22	19	232	176	126	38	154	15	
211630-9	433.9	3.36	0.73	4149	1487	4.99	85	91	23	61	29	108	25	15	203	166	129	39	131	15	8
211630-9	436.2	3.42	0.67	4379	1388	5.04	156	136	21	52	35	111	21	2	235	179	124	30	153	15	1
211630-9	439.7	3.63	0.80	4795	1863	5.71	169	129	27	55	38	119	24	28	273	165	131	41	137	17	7
211630-9	441.0	3.32	0.78	4012	1740	5.21	106	87	23	50	34	110	21	3	264	148	119	38	147	22	8
211630-9	444.0	3.17	0.78	4155	1860	5.30	162	127	26	49	31	108	19	14	247	162	119	31	135	19	1
211630-9	445.8	3.28	0.74	4144	1228	5.01	115	100	24	56	35	111	22	14	262	162	132	35	141	13	1
211630-9	447.8	3.29	0.73	4260	1301	5.15	150	90	24	53	32	109	20	19	268	162	122	42	134	15	4
211630-9	449.6	3.12	0.81	4009	1831	5.13	127	115	25	56	35	111	20	8	254	163	118	29	134	17	
211630-9	454.7	3.08	0.75	4048	1369	5.31	111	64	28	57	36	110	23	26	252	175	124	46	146	19	2
211630-9	458.2	3.12	0.70	3930	1514	5.23	87	99	27	54	37	107	22	14	264	146	123	36	130	7	4
211630-9	459.9	3.13	0.72	3947	1396	5.42	125	111	24	55	33	107	20	12	252	167	128	41	134	15	9
211630-9	461.7	3.10	0.67	4007	1308	5.12	103	81	21	55	34	108	20	15	251	159	135	51	149	14	11
211630-9	465.3	3.00	0.69	3674	1136	5.10	142	87	29	62	42	115	21	21	272	175	133	45	153	14	7
211630-9	466.5	3.07	0.68	3917	1307	5.28	126	117	24	54	35	109	20	17	259	188	138	49	153	17	5
211630-9	468.7	3.07	0.71	4062	1555	5.63	149	71	27	42	35	110	22	24	269	175	133	41	155	16	7
211630-9	471.0	3.18	0.79	4251	1283	5.41	161	90	22	49	33	112	23	8	255	185	141	41	157	14	10
211630-9	475.6	3.16	0.76	4165	1334	5.55	144	106	25	56	36	114	22	15	255	166	126	34	144	12	11
211630-9	478.1	3.31	0.81	4193	1264	5.34	149	72	29	53	35	117	23	15	240	167	122	42	155	20	10
211630-9	479.4	3.38	0.83	4320	1261	5.33	146	114	23	56	31	116	23	23	239	172	156	52	146	13	2
211630-9	481.1	3.23	0.95	4134	1479	5.18	102	81	22	55	36	111	22	9	236	170	141	41	138	16	2
211630-9	482.9	3.30	0.83	4285	1454	5.35	132	141	27	53	32	111	23	23	224	179	131	38	148	22	9
211630-9	483.2	3.27	1.12	3924	7882	5.31	110	90	27	49	32	110	22	5	193	159	132	36	141	18	9
211630-9	484.3	3.53	0.85	4323	1723	5.36	174	70	23	56	31	117	21	17	208	155	122	46	152	18	7
211630-9	490.7	3.21	1.15	3860	5631	5.27	121	86	25	51	31	111	20	6	195	182	118	39	147	10	9
211630-9	493.5	3.41	0.90	4170	3894	5.36	110	74	26	57	37	110	21	3	198	157	124	40	136	15	8
211630-9	498.9	3.39	0.97	4177	3655	5.30	137	95	20	53	27	110	20	17	200	150	140	44	147	20	4
211630-9	501.9	3.31	0.81	4118	1519	4.99	125	122	22	47	24	111	23	12	180	158	124	36	140	18	5
211630-9	504.5	3.41	0.82	4453	1413	5.22	125	121	23	54	30	114	21	18	203	155	126	32	135	11	8
211630-9	507.0	3.18	0.95	3956	1717	5.07	96	102	22	57	34	113	22	18	189	171	126	40	143	9	
211630-9	512.8	3.23	1.14	3959	7840	4.97	105	99	21	53	30	108	21	14	190	160	124	37	151	20	7
211630-9	515.3	3.32	0.86	4296	2599	5.20	135	137	24	53	22	109	22	29	181	170	125	37	136	17	6
211630-9	518.2	3.49	0.85	4233	1860	5.27	129	65	25	57	37	116	23	8	187	175	141	56	153	12	4
211630-9	523.4	3.34	0.83	4089	1898	5.20	99	92	26	58	25	110	20	12	190	159	130	36	131	12	7
211630-9	527.9	3.11	0.84	4024	2644	4.91	130	84	19	63	35	112	23	23	190	187	124	42	151	19	7
211630-9	533.0	3.41	0.94	4157	5203	5.25	130	130	25	51	26	112	23	28	183	162	127	36	146	11	8
211630-9	536.1	3.48	0.96	4191	6080	5.31	109	59	23	52	27	110	20	22	178	184	134	46	148	17	5
211630-9	538.7	3.39	0.96	4166	4596	5.34	109	92	22	53	25	110	19	11	159						

211630-9	547.8	2.97	0.74	3804	1786	4.53	117	76	17	50	16	143	20	13	125
211630-9	551.7	3.52	0.91	4369	3118	5.33	154	97	27	56	23	133	24	14	137
211630-9	553.5	3.46	0.92	4231	2414	5.18	143	103	26	62	29	224	24	19	140

Core: 211660-1 Gotland Basin Samples from paleomag. measurements

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-1	2.0	3.54	1.08	3613	32405	5.33	41	59	15	51	41	114	23	26	102	138	123	21	98	5	38
211660-1	4.4	3.21	1.72	3168	50451	5.47	65	65	8	46	51	113	21		117	119	129	18	86	3	53
211660-1	7.0	2.83	2.79	2212	90432	5.50	41	27	2	44	59	96	17	39	102	67	147	9	62	9	79
211660-1	9.6	3.30	1.78	3043	41289	5.79	95	27	14	44	44	97	20	23	103	114	122	19	80	8	42
211660-1	12.3	2.04	1.09	1580	20035	2.92	16	25	6	30	42	78	21	16	62	55	71	12	59	7	42
211660-1	14.7	2.67	1.09	2688	21712	6.18	119	94	22	58	86	117	21	26	126	86	95	20	82	5	135
211660-1	17.4	2.97	0.55	3436	2506	6.76	146	53	30	67	91	126	19	13	152	111	98	22	86	5	165
211660-1	20.2	2.37	0.84	2717	12301	5.96	112	40	18	70	152	114	19	6	166	67	110	18	69	7	184
211660-1	23.0	1.97	2.02	1471	101949	5.08		9	3	45	88	91	14	42	129	61	128	20	52	11	172
211660-1	25.6	1.74	1.01	1798	5084	4.54	43	38	15	51	84	88	23	13	105	29	50	8	45	6	108
211660-1	28.5	2.17	0.65	2269	5016	6.43	129	44	26	62	108	90	19	10	151	65	75	8	61	2	167
211660-1	31.2	2.43	1.17	2575	27948	6.65	50	29	19	48	89	97	16	17	137	85	101	22	70	8	169
211660-1	33.8	2.01	0.81	1986	15891	6.18	32	34	20	56	99	84	19	18	130	68	82	13	62	5	150
211660-1	36.5	2.23	1.09	2386	26475	5.35	66	28	18	39	76	93	18	12	129	60	92	27	73	5	126
211660-1	39.0	2.35	0.86	2677	10215	4.66	77	58	12	52	64	87	20	6	125	71	96	18	71	8	111
211660-1	41.5	2.54	0.97	2916	15830	6.40	102	45	26	58	86	102	21	18	145	76	96	19	80	7	122
211660-1	44.3	2.33	1.45	2432	28650	5.94	46	53	18	46	64	90	20	35	110	61	103	6	63	4	113
211660-1	47.0	2.15	1.75	1943	44297	5.53	58	35	8	40	58	81	17	21	109	70	108	13	61	3	129
211660-1	49.5	2.06	1.40	1928	24786	4.92	103	20	9	52	49	79	22	20	89	45	90	12	50	3	67
211660-1	52.3	2.71	1.40	2814	34348	6.46	62	29	16	46	69	96	18	32	112	103	111	15	72	4	118
211660-1	55.0	2.63	1.00	2659	16832	6.51	124	44	28	50	77	103	21	14	128	119	110	27	98	7	106
211660-1	57.5	2.35	0.58	2813	5496	6.38	85	62	26	55	92	102	22	31	129	97	87	30	76	10	114
211660-1	60.2	2.09	1.12	2179	13252	5.47	74	28	19	54	78	81	20	21	117	45	76	16	58	6	143
211660-1	63.0	2.03	2.01	1723	28928	4.06		8	28	62	74	23	26	82	41	72	13	50	0	91	
211660-1	65.5	1.65	1.03	1607	8339	4.75	28		15	36	66	74	18	12	123	40	84	9	49	5	157
211660-1	68.0	2.60	1.75	2649	48760	6.58	71	99	18	46	80	97	18	22	120	89	124	22	75	5	133
211660-1	70.4	2.07	1.82	1642	44830	4.73	15	36	6	30	45	70	19	16	89	42	115	6	48		98
211660-1	73.0	2.46	1.69	2461	35122	5.33	88	20	7	37	59	84	16	27	112	118	136	28	80	2	102
211660-1	75.4	2.79	0.99	3094	16094	7.14	129	12	27	49	79	99	19	32	134	110	102	18	83	8	134
211660-1	78.4	2.71	4.05	2110	99664	4.83			30	29	74	14	33	84	74	175	24	82	7	33	
211660-1	81.0	2.99	2.04	2997	40017	5.92	53	50	13	41	48	93	18	17	98	96	131	27	78	2	31
211660-1	84.1	3.38	1.01	3629	22087	5.85	111	110	16	48	46	105	23	24	108	134	123	38	107	12	17
211660-1	86.7	3.37	1.62	3334	43054	6.00	100	45	13	45	56	106	22	24	120	123	144	28	91	8	34
211660-1	89.3	3.45	1.13	3753	20755	5.95	119	105	21	49	61	111	22	28	126	144	135	29	100	5	25
211660-1	92.0	3.18	2.68	2906	57865	5.72		20	12	42	50	96	21	43	102	136	144	29	94	7	30
211660-1	95.1	3.24	1.34	3447	25361	7.00	105	31	24	53	75	108	23	42	125	150	135	24	105	2	48
211660-1	97.9	3.10	2.42	2899	53347	5.77	62	14	13	41	55	94	20	33	94	111	150	34	83	12	22
211660-1	100.8	3.26	2.43	3105	55128	5.71	26	73	13	38	41	94	17	34	98	134	159	36	90	10	21
211660-1	103.4	3.26	2.49	2782	53704	6.39	61	56	17	41	47	96	16	16	103	131	163	31	89	2	24
211660-1	105.9	2.98	2.66	2583	60836	6.68	42	24	12	39	54	89	18	40	94	114	162	30	82	5	62

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-1	110.0	2.98	3.76	2488	86937	6.23	2	5	8	28	42	83	16	25	88	103	168	23	85	7	41
211660-1	113.9	3.41	1.97	3293	45810	5.26	91	107	15	42	39	97	22	21	77	126	146	36	94	8	14
211660-1	116.4	3.25	1.97	3004	49267	5.90	48	74	16	38	42	94	18	27	91	122	150	37	96	5	22
211660-1	119.1	3.57	1.72	3423	43151	5.80	62	54	15	48	43	101	21	32	87	134	158	37	99	10	36
211660-1	121.7	3.62	1.21	3901	23867	5.68	158	111	18	54	47	108	21	26	97	141	140	30	96	10	11
211660-1	124.2	3.53	1.29	3561	30422	6.16	120	115	20	46	43	103	20	36	96	158	148	32	101	11	25
211660-1	126.9	3.61	1.35	3947	23244	5.17	114	77	19	53	53	111	22	24	96	129	118	35	100	6	11
211660-1	132.8	3.69	1.63	3495	36370	5.70	83	76	17	44	43	106	22	21	93	155	146	32	106	7	17
211660-1	136.0	3.43	2.21	3184	50169	5.30	76	78	7	45	46	98	21	25	90	113	140	30	88	13	21
211660-1	138.8	3.09	1.89	3033	40068	5.53	31	41	14	37	52	96	20	35	92	120	158	39	103	4	46
211660-1	141.7	3.57	1.91	3346	46015	5.58	100	66	11	40	49	99	21	27	93	147	151	27	99	8	23
211660-1	144.6	3.78	1.37	3650	30243	5.12	31	72	15	49	35	97	25	18	73	127	146	21	99	8	13
211660-1	147.5	3.73	1.03	4104	14486	5.29	138	108	22	55	53	120	27	32	104	154	127	35	111	2	21
211660-1	150.9	3.65	1.48	3783	30022	5.32	94	82	16	49	43	105	22	41	93	137	147	32	96	5	22
211660-1	153.8	3.58	1.77	3403	35492	5.68	78	114	10	44	50	103	22	27	99	118	145	32	99	10	22
211660-1	156.8	3.65	2.11	3310	49416	5.38	74	74	14	43	44	101	22	30	89	146	171	32	100		20
211660-1	159.7	3.44	2.55	2942	63813	5.21	22	36	10	37	42	93	16	27	89	139	180	36	98	15	38
211660-1	162.6	3.60	1.86	3386	41125	5.24	84	59	11	53	52	105	21	28	101	133	148	35	110	11	21
211660-1	165.7	3.89	1.22	3902	22469	5.33	102	74	24	52	41	112	25	29	92	167	156	36	119	9	15
211660-1	168.8	3.47	1.36	3617	26565	5.55	117	113	15	56	45	107	21	30	97	147	133	40	108	12	21
211660-1	171.7	3.42	1.03	3659	16609	5.78	84	96	23	54	67	116	23	14	111	150	136	34	116	14	33
211660-1	174.7	3.30	2.13	3215	48529	5.70	122	62	16	41	40	95	18	21	90	135	144	22	93	3	34
211660-1	178.4	3.39	1.76	3337	37092	5.03	93	29	11	33	41	97	19	24	79	97	122	17	70	1	27
211660-1	182.4	3.41	1.00	3672	12198	5.93	117	82	32	59	68	113	21	28	119	155	128	25	116	10	59
211660-1	185.1	2.83	2.09	2671	55456	5.83	37	42	9	40	49	88	16	37	88	109	166	30	89	12	67
211660-1	188.1	3.00	2.44	2709	64482	5.28	86	52	11	42	51	91	20	28	90	100	167	26	86	7	42
211660-1	191.3	3.03	1.86	2947	48635	5.74	77	61	15	40	56	95	18	21	106	113	141	19	89	10	52
211660-1	194.3	3.27	2.18	3183	53169	5.97	29	29	17	44	56	95	19	39	96	135	189	43	105	8	72
211660-1	197.0	3.87	1.57	3961	33414	6.52	133	66	22	60	58	112	23	29	103	147	145	31	112	6	26
211660-1	199.7	3.54	1.43	3932	25133	6.08	86	93	23	54	53	110	20	23	104	147	151	28	115	3	30
211660-1	202.8	3.30	2.13	3264	49002	5.68	110	60	12	42	48	96	17	30	93	121	162	42	110	14	86
211660-1	205.7	3.26	1.84	3429	36233	6.43	166	51	21	53	56	103	22	41	109	138	158	34	113	8	98
211660-1	208.5	3.04	1.79	3180	44249	6.26	96	48	18	52	66	96	21	40	99	112	118	12	73	3	110
211660-1	211.2	3.00	2.17	3214	50061	6.02	84	33	21	45	60	94	18	40	104	109	148	25	87	5	101
211660-1	214.0	2.45	1.04	2999	21492	6.29	96	23	19	53	103	96	17	15	130	88	110	26	75	5	163
211660-1	217.0	2.93	1.22	3369	23574	6.69	149	70	23	59	99	107	16	19	148	116	136	26	90	6	180
211660-1	219.9	2.67	2.62	2385	65692	6.45	49	19	10	45	73	84	17	46	104	93	158	26	92	8	181
211660-1	222.6	2.16	1.51	2379	40772	5.66	88		16	53	89	84	17	43	116	81	126	25	66	0	190
211660-1	225.3	2.79	1.20	3123	26879	5.79	139	36	14	56	71	98	19	28	117	124	114	23	84	11	117
211660-1	228.2	3.02	1.60	3208	39500	5.84	114	41	15	43	72	104	19	16	107	104	118	28	89	9	110
211660-1	231.0	2.93	2.66	2650	62251	5.93	46	25	6	49	72	94	15	28	112	122	172	40	95	2	127
211660-1	233.0	3.32	2.11	3336	51854	6.14	75	80	19	41	63	102	18	38	110	143	142	37	105	16	90
211660-1	236.9	3.51	1.38	3699	24298	6.16	130	42	28	59	67	108	20	31	105	130	187	42	99	10	106
211660-1	239.8	2.93	2.90	2832	64721	5.68	77	46	5	39	50	90	17	44	97	121	174	31	99	9	123
211660-1	242.8	3.10	2.22	3047	52806	6.25	88	27	11	42	61	93	18	29	100	119	150	28	93	12	105
211660-1	246.0	3.14	2.19	3063	44378	6.03	49	47	19	54	62	96	19	37	96	121	166	28	88	7	114
211660-1	248.7	2.91	2.68	2546	68571	5.95	59	29	8	35	53	87	14	36	88	103	131	31	87	13	136

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-1	251.5	2.80	1.61	2958	40472	5.67	68	46	13	55	74	97	20	43	106	131	156	37	105	17	69
211660-1	254.4	3.25	2.36	3235	52558	6.25	58	78	19	40	53	94	16	38	84	130	144	30	103	13	79
211660-1	257.3	3.19	1.79	3119	40794	6.11	73	39	16	49	56	97	19	32	88	80	101	17	57	1	76
211660-1	260.2	2.91	1.62	3104	29614	4.80	121	57	13	50	65	93	20	19	81	106	111	13	84	7	106
211660-1	262.9	2.65	1.31	3073	23871	5.35	120	68	18	47	66	96	17	12	108	5	2				9
211660-1	265.9	3.57	1.10	3967	15253	6.11	138	92	29	47	58	120	24	29	110	176	143	43	114	14	92
211660-1	268.6	2.82	2.26	2522	65644	5.09	93	1	5	36	60	107	20	32	133	122	174	30	89	11	134
211660-1	271.5	2.85	0.96	3029	16134	5.34	119	85	20	54	55	98	19	22	123	134	114	25	87	6	93
211660-1	274.3	3.07	1.32	3383	29895	6.10	99	54	17	40	61	101	20	19	109	122	126	14	93	7	96
211660-1	277.1	2.97	1.34	3224	27962	5.99	100	119	22	52	61	103	19	19	129	119	139	16	88	16	109
211660-1	280.9	3.73	1.77	3773	33693	5.36	25	60	12	49	35	101	22	25	66	142	155	31	100	9	24
211660-1	283.8	3.87	1.95	3836	39872	5.47	76	67	22	45	34	103	22	27	63	171	177	47	115	10	24
211660-1	286.8	3.32	1.64	3257	32060	4.27	71	80	11	35	35	100	27	18	56	165	159	40	108	14	30
211660-1	289.7	3.92	0.99	4301	12533	5.65	153	108	31	58	41	117	26	24	74	187	142	36	123	15	16
211660-1	292.5	3.95	1.09	4209	12256	5.68	156	109	25	55	40	120	23	10	81	180	148	47	118	13	18
211660-1	295.5	4.02	1.95	3706	35548	5.23	75	44	12	43	29	106	25	35	67	161	177	42	116	14	22
211660-1	298.3	2.94	0.78	3454	8352	5.07	108	82	20	42	45	97	21	9	71	157	137	33	115	11	41
211660-1	301.1	3.04	1.41	3227	31072	5.20	49	68	18	42	43	99	20	27	79	98	98	16	84	3	18
211660-1	303.9	2.30	1.58	2057	53341	4.24	54	8	4	42	48	84	20	21	99	130	128	27	85	9	46
211660-1	306.6	2.71	2.00	2676	46415	5.08	21		18	30	35	87	17	32	75	102	142	17	60		68
211660-1	309.5	3.56	1.29	3868	20230	5.58	103	69	18	49	44	108	22	31	81	128	144	27	79	6	44
211660-1	312.3	3.44	1.70	3574	36780	5.58	53	31	17	41	39	99	19	35	70	162	141	35	110	6	34
211660-1	315.0	3.40	1.36	3766	25968	5.66	76	47	22	49	41	103	23	28	69	149	147	42	107	8	37
211660-1	317.8	3.09	2.16	3066	48061	4.67	36	50	7	47	30	92	20	29	60	163	133	37	104	7	35
211660-1	320.5	3.59	2.09	3690	39558	5.26	58	48	13	46	35	102	20	31	66	160	176	37	113	6	33
211660-1	323.2	2.96	2.01	2799	46575	4.78	53	77	12	43	49	94	19	27	64	154	163	33	107	7	31
211660-1	327.2	3.43	2.15	3525	43517	5.62	66	62	20	47	45	103	19	35	73	137	156	29	90	6	71
211660-1	330.4	3.56	2.21	3541	43303	5.58	54	54	17	41	40	99	21	40	69	159	160	34	114	10	57
211660-1	333.9	3.43	2.09	3454	46338	5.84	99	52	13	47	58	101	20	21	77	158	147	33	100	9	104
211660-1	336.8	3.16	3.36	2478	77234	5.48	31	59	8	38	53	91	16	30	71	107	164	26	90	9	117
211660-1	339.7	2.99	2.94	2533	71461	5.06	67	76	11	50	76	88	21	37	61	94	137	23	76	2	130
211660-1	342.5	3.66	3.18	3136	82170	6.30	59	72	9	56	78	98	20	45	75	130	165	25	105	14	140
211660-1	345.3	3.68	2.96	3416	63533	5.16	15	68	9	48	55	100	20	26	62	158	176	43	116	15	44
211660-1	348.2	3.80	1.67	3594	32069	5.16	94	37	15	58	52	106	24	18	59	163	135	31	101	15	42
211660-1	351.2	3.53	2.50	3366	63256	5.07	41	87	8	52	67	100	19	18	59	140	148	28	89	14	82
211660-1	354.2	3.11	3.19	2382	103078	4.43		25		56	77	89	18	26	60	103	147	25	80	7	69
211660-1	357.2	3.12	2.03	2745	62353	4.36	30	56	5	48	70	94	23	29	64	130	150	39	84	7	73
211660-1	360.5	3.00	1.05	2695	26383	4.02	46	89	9	47	54	90	22	15	59	95	100	19	69	9	21
211660-1	363.4	3.09	1.26	2856	30936	3.89	58	66	8	53	54	92	27	16	59	96	81	13	76	6	19
211660-1	366.3	2.95	0.78	2836	17806	3.84	25	93	16	48	47	95	26	21	53	127	89	24	79	8	11
211660-1	369.7	3.74	0.74	4045	10355	5.14	72	104	22	47	45	106	23	21	55	161	127	42	120	8	9
211660-1	372.8	3.62	0.65	3840	8102	5.66	91	59	26	58	54	115	24	21	73	177	147	29	121	15	18
211660-1	375.7	3.47	0.69	3721	9287	5.00	72	83	26	54	51	113	27	15	61	138	110	36	101	8	14
211660-1	378.8	3.50	0.73	3613	11947	5.23	85	102	29	50	53	110	25	23	65	165	123	32	116	10	7
211660-1	382.0	3.33	1.33	3518	1358	4.99	108	63	16	39	46	105	24	21	74	139	111	24	94	7	3
211660-1	385.0	3.61	0.60	3926	1306	4.96	117	94	27	52	55	118	24	8	60	185	130	38	115	11	
211660-1	388.1	3.67	0.56	3853	1114	4.78	101	96	21	51	54	115	24	7	58	164	148	47	119	12	3

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-1	391.0	3.82	0.60	4121	1100	5.01	105	144	24	44	54	117	23	7	55	194	145	38	122	11	
211660-1	394.1	3.65	0.59	4122	1603	5.10	110	70	25	41	52	116	24		54	173	120	36	116	13	
211660-1	397.4	3.02	0.51	3186	1249	4.17	97	80	21	43	42	103	22	5	43	150	128	27	94	5	
211660-1	400.6	3.51	0.57	3843	1548	4.94	60	116	21	48	55	116	24	11	55	185	133	31	117	8	
211660-1	403.9	3.91	0.61	4065	2281	5.73	86	60	29	55	56	117	23	7	55	189	144	41	122	10	
211660-1	406.9	3.76	0.59	3923	1899	5.42	113	90	29	51	56	117	23	6	55	177	137	39	125	13	5
211660-1	409.9	3.70	0.60	3944	1840	5.30	134	118	24	51	53	115	22	9	53	175	137	40	123	13	0
211660-1	412.8	3.86	0.62	3990	2074	5.65	67	75	23	54	56	118	22	15	59	179	147	38	124	12	2
211660-1	415.7	3.75	0.61	4121	1369	4.94	105	104	23	50	59	114	23	7	49	190	136	39	118	14	
211660-1	418.8	3.00	0.48	3058	931	3.94	15	40	13	39	40	103	23	11	50	178	136	35	123	15	
211660-1	422.0	3.65	0.61	3948	1045	4.73	88	114	25	45	54	114	24	25	55	194	137	29	106	12	
211660-1	425.4	3.78	0.62	3890	1331	5.72	34	42	33	75	50	111	23	66	50	176	137	33	114	17	
211660-1	431.7	3.70	0.64	3980	754	6.21	165	121	28	51	58	117	25	4	51	190	139	38	126	12	
211660-1	435.1	3.95	0.66	4195	797	5.68	133	121	31	59	69	119	24	7	54	197	141	37	130	19	
211660-1	438.5	3.94	0.61	4079	792	5.77	94	109	25	54	61	118	24		49	195	129	44	135	15	1
211660-1	443.0	3.93	0.65	4050	793	5.34	94	83	23	49	60	121	29	15	47	201	134	39	123	12	
211660-1	446.5	3.61	0.58	3834	716	6.07	103	88	26	55	59	116	23	7	47	178	138	44	117	15	4
211660-1	450.4	3.88	0.62	3977	741	5.25	123	109	29	42	61	119	25	16	46	184	131	43	134	11	1
211660-1	455.0	3.88	0.56	3702	716	5.67	104	107	25	54	59	115	27	7	43	190	138	41	125	18	
211660-1	459.9	3.47	0.58	3406	763	5.50	130	138	27	45	59	111	25	18	40	190	136	39	124	12	
211660-1	463.1	3.81	0.62	3337	752	4.89	116	105	27	54	58	119	24	8	41	194	152	31	105	13	
211660-1	466.9	3.65	0.57	3301	657	5.84	79	89	29	47	52	108	24	64	40	170	141	30	106	9	
211660-1	474.6	3.75	0.59	3382	746	4.47	92	111	15	45	44	119	23	12	36	211	146	32	115	15	
211660-1	478.4	3.80	0.59	2659	686	4.98	102	66	26	46	42	116	23	9	39	204	157	29	112	15	
211660-1	482.2	3.98	0.62	3101	689	5.63	66	122	27	54	44	116	26	15	34	172	145	40	105	7	
211660-1	485.4	4.07	0.62	3346	721	5.57	57	95	29	57	44	122	26	15	37	220	142	42	110	17	
211660-1	489.3	4.55	0.67	3836	853	6.45	124	120	31	49	37	121	25	12	30	225	133	30	123	12	
211660-1	494.5	4.29	0.64	4059	927	7.26	135	91	34	44	44	127	27	11	34	224	137	41	129	14	
211660-1	499.2	4.40	0.68	4573	961	6.76	162	109	37	50	44	139	28	15	25	219	131	36	128	11	2
211660-1	502.1	4.30	0.71	4434	927	7.38	128	98	42	54	47	135	28	20	29	226	131	44	126	14	
211660-1	505.3	4.34	0.70	4679	978	7.35	141	146	32	58	51	145	25	7	34	215	125	41	140	13	
211660-1	508.6	4.21	0.72	4504	953	7.47	146	123	45	53	47	138	26	14	27	213	123	44	115	10	
211660-1	512.8	4.30	0.71	4953	970	6.78	153	122	38	49	51	139	27	14	27	237	129	40	137	15	
211660-1	515.7	4.16	0.72	4866	974	7.34	162	112	39	51	49	139	25	18	32	219	123	47	128	16	
211660-1	520.3	4.16	0.71	4868	932	7.14	120	123	37	58	51	135	29	27	28	207	112	44	128	11	
211660-1	526.4	4.33	0.70	4956	891	7.36	135	177	39	58	56	138	29	19	32	210	122	55	141	17	
211660-1	535.2	4.07	0.70	5126	935	7.26	130	167	33	58	54	148	28	19	35	226	126	49	137	17	
211660-1	538.4	3.29	0.62	3886	655	5.22	137	109	25	41	42	119	31	24	26	194	115	44	129	17	
211660-1	543.2	3.44	0.62	4319	752	5.66	161	128	26	56	42	120	28	11	26	195	116	45	111	14	1
211660-1	552.8	3.26	0.50	3738	556	4.87	81	72	22	44	35	110	28	18	21	186	101	28	111	13	
211660-1	556.2	4.08	0.61	4530	755	6.47	124	152	34	55	45	134	27	33	32	224	122	35	123	15	
211660-1	558.9	4.06	0.63	4584	732	6.25	139	121	41	56	42	131	30	22	30	218	125	45	130	14	
211660-1	565.7	2.06	0.35	1865	255	2.40	19	66	6	27	20	76	27	11	13	103	49	20	61	3	
211660-1	572.0	3.81	0.62	3912	597	5.33	109	94	29	53	38	118	29	10	30	205	125	38	117	12	1
211660-1	575.2	3.10	0.47	2921	470	4.09	39	74	18	39	24	95	26		22	178	105	27	90	13	4
211660-1	578.6	4.07	0.62	4224	692	6.04	128	158	33	64	45	130	31	28	34	211	132	50	119	14	
211660-1	583.3	3.91	0.58	4012	635	5.51	96	104	29	49	33	118	27	18	28	191	116	41	101	13	2

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
211660-1	587.2	4.10	0.59	4359	669	5.95	85	125	31	53	40	124	27	4	34	211	132	36	116	10	
211660-1	590.1	4.80	0.71	4936	737	6.58	165	110	36	54	46	139	27	12	38	225	142	43	132	18	2
211660-1	593.2	4.34	0.63	4383	690	5.95	112	118	26	52	40	124	24	5	32	222	125	28	119	16	1
211660-1	596.2	4.39	0.66	4381	672	5.99	137	80	30	56	43	131	29	20	32	213	127	28	110	15	
211660-1	599.4	4.77	0.66	4748	773	6.33	166	125	28	58	47	127	30	18	35	214	133	43	121	16	
211660-1	601.9	4.63	0.63	4948	655	6.12	161	143	31	61	59	132	29	22	44	195	128	39	125	16	
211660-1	604.8	4.12	0.57	4850	636	5.98	138	125	31	68	65	123	25	8	40	182	117	40	135	18	3
211660-1	607.7	4.15	0.63	4950	644	6.36	139	138	33	61	58	122	24	20	36	212	127	41	142	26	0
211660-1	610.9	3.91	0.60	4751	576	7.57	100	94	41	80	63	122	21	26	42	201	122	35	132	17	0
211660-1	614.1	4.10	0.65	4747	688	6.43	177	147	32	51	49	131	24	16	37	217	140	42	130	17	
211660-1	617.2	4.29	0.70	5077	743	7.22	149	124	34	59	49	142	28	21	33	238	136	53	134	19	
211660-1	620.4	4.41	0.70	5317	739	7.16	160	119	39	58	41	134	26	12	27	240	116	36	140	21	
211660-1	623.4	4.69	0.74	5641	798	7.51	146	114	35	67	53	147	26	5	33	237	119	61	143	21	
211660-1	626.4	4.22	0.69	5306	739	7.21	142	119	34	52	41	133	26	18	31	206	129	48	135	22	
211660-1	629.5	4.25	0.66	5257	702	7.12	125	83	32	58	40	134	26	21	26	226	122	46	135	19	
211660-1	632.6	4.33	0.73	5374	742	7.27	189	108	43	59	53	138	26	2	32	216	122	50	134	21	
211660-1	635.8	4.19	0.67	5307	708	6.85	135	111	32	57	35	127	26	0	27	225	116	39	132	22	
211660-1	638.8	4.29	0.67	5398	687	7.02	174	128	34	63	38	129	26	10	29	226	115	46	134	18	
211660-1	641.8	4.20	0.65	5329	717	7.15	156	154	33	60	42	130	27	13	27	207	118	41	128	15	
211660-1	645.5	4.15	0.67	5271	673	7.08	121	120	35	55	38	128	26	9	27	212	113	44	127	17	
211660-1	648.5	4.19	0.65	5264	672	6.98	109	124	33	61	40	128	25	12	29	199	104	37	139	21	
211660-1	651.5	4.11	0.61	4943	703	7.15	132	134	31	58	43	134	29	26	25	201	111	45	138	17	
211660-1	654.6	4.42	0.69	5573	760	7.48	182	126	32	54	49	140	26	23	29	213	121	46	141	12	
211660-1	657.7	4.29	0.75	5031	766	6.71	164	144	37	57	41	129	29	6	22	185	99	35	123	10	
211660-1	660.9	4.59	0.78	5418	800	7.13	163	139	40	54	46	135	31	7	26	227	111	46	138	21	
211660-1	664.1	4.26	0.75	5373	810	7.18	186	67	35	58	43	136	27	5	26	230	120	52	140	8	3
211660-1	667.1	4.49	0.74	5450	824	7.23	188	138	36	58	39	135	28	19	26	223	123	48	145	21	1
211660-1	670.4	4.43	0.76	5305	870	6.88	192	130	37	55	36	132	29	14	20	218	117	40	141	19	1
211660-1	673.5	4.27	0.70	5234	810	7.11	175	149	39	62	41	136	29	7	24	230	117	42	134	16	
211660-1	676.8	4.37	0.72	5231	791	7.09	178	140	34	56	35	134	30	7	24	212	123	46	144	15	
211660-1	679.8	4.39	0.73	5356	723	6.91	170	112	37	58	38	131	28	19	28	211	120	39	144	19	
211660-1	682.6	4.30	0.69	5192	671	6.92	179	108	35	64	37	132	26	2	26	215	118	42	148	24	
211660-1	687.1	4.21	0.73	5459	775	7.52	136	119	33	58	46	141	28	11	27	231	129	53	144	17	
211660-1	690.8	4.21	0.77	5006	656	6.66	176	147	36	48	46	134	27	9	27	204	132	50	129	17	
211660-1	695.8	4.58	0.73	4622	596	6.37	117	117	36	52	41	129	27	14	25	217	152	50	142	16	
211660-1	699.0	4.26	0.67	4468	604	6.70	132	92	28	52	36	125	24	13	26	219	130	44	141	14	
211660-1	702.2	4.50	0.68	4615	585	6.59	151	120	31	51	32	128	26		20	206	138	48	147	17	1
211660-1	705.3	4.45	0.72	4511	579	6.51	145	134	35	49	41	126	27	17	22	208	127	44	139	16	
211660-1	708.4	4.37	0.68	4949	629	6.83	174	118	38	48	37	126	27	10	21	219	129	42	138	14	
211660-1	711.6	4.10	0.63	4523	569	6.49	133	147	33	51	37	127	26	13	23	220	128	45	152	20	
211660-1	715.1	4.10	0.58	4453	575	6.68	125	119	30	53	37	123	26	10	22	225	134	52	147	23	2
211660-1	719.1	4.05	0.62	4638	579	6.52	134	133	27	55	37	125	26	13	24	227	124	44	152	11	2
211660-1	722.4	4.12	0.60	4253	530	5.94	132	159	29	52	40	122	26	13	22	206	125	44	146	13	
211660-1	725.1	4.61	0.65	4592	615	7.23	122	92	38	54	35	127	28	17	23	211	135	48	138	19	
211660-1	728.1	4.25	0.61	4462	545	6.52	128	107	29	51	35	125	25	9	21	204	121	52	158	20	0
211660-1	731.1	4.26	0.61	4219	496	6.19	127	108	24	52	37	119	27	18	19	205	129	49	151	14	1
211660-1	734.7	4.35	0.67	4601	563	6.66	128	73	31	55	31	121	26	14	20	230	134	39	160	9	

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211660-1	738.2	3.64	0.59	4015	489	5.57	121	115	30	53	29	115	23	8	19	208	125	47	146	16	
211660-1	741.8	4.32	0.66	4474	565	6.34	168	125	36	55	39	128	28	6	22	211	140	55	143	15	0
211660-1	745.3	4.40	0.70	4802	610	6.59	166	125	30	59	40	122	28	9	21	221	140	38	155	19	
211660-1	748.8	4.39	0.67	4571	527	6.34	163	105	31	48	44	125	25	1	20	212	132	39	155	15	1
211660-1	752.3	4.33	0.67	5079	591	6.83	157	166	38	56	30	123	27	2	17	208	138	27	126	12	3
211660-1	755.9	4.34	0.70	4979	615	6.93	125	150	34	60	35	127	29	17	20	212	129	46	146	15	
211660-1	759.8	4.20	0.70	5143	653	6.97	181	143	38	50	37	127	26	13	20	213	139	49	145	20	1
211660-1	763.1	4.52	0.76	5622	727	7.68	174	171	39	55	42	138	28	22	25	215	144	49	154	24	2
211660-1	766.5	4.11	0.74	5505	719	7.49	165	143	35	54	42	131	29	26	21	234	149	56	144	15	
211660-1	770.3	4.01	0.74	5361	706	7.47	110	118	33	49	46	132	26	15	25	202	129	41	141	23	2
211660-1	773.2	4.30	0.72	5289	643	7.22	119	136	36	50	37	131	28	21	20	198	133	47	148	19	
211660-1	777.2	4.23	0.67	5399	707	7.44	162	136	34	55	46	130	26	14	25	193	120	44	142	15	
211660-1	780.7	4.16	0.70	5537	644	7.19	148	68	38	57	35	126	27	26	22	224	135	47	148	18	
211660-1	784.1	4.21	0.65	5274	585	6.75	158	96	41	57	36	124	25	7	22	206	115	38	144	16	
211660-1	787.7	4.16	0.64	5240	631	6.85	145	102	32	58	37	125	27	9	21	227	127	47	140	22	
211660-1	791.3	3.93	0.67	5215	601	6.41	153	118	35	56	38	124	26	17	22	208	121	39	153	19	
211660-1	794.7	4.28	0.69	5346	637	6.93	164	159	34	49	34	124	28	25	18	212	132	43	147	17	
211660-1	798.0	4.10	0.69	5364	640	6.89	128	130	35	53	37	128	28	12	19	212	124	43	157	25	
211660-1	801.0	4.05	0.69	5345	607	6.94	202	130	35	49	34	121	25	19	22	216	133	54	150	17	
211660-1	804.6	4.14	0.73	5282	616	6.89	132	123	25	52	30	123	27	6	24	209	132	45	148	18	2
211660-1	807.7	3.98	0.66	5323	626	6.86	148	122	31	51	37	120	26	28	20	194	122	45	149	16	
211660-1	811.1	4.11	0.69	5301	621	6.75	155	92	37	59	40	126	26	3	22	200	125	43	146	17	
211660-1	814.3	4.17	0.71	5561	622	6.96	129	127	34	57	35	125	27	12	22	197	127	52	166	29	2
211660-1	817.4	4.27	0.68	5360	647	6.92	124	137	35	56	38	128	26	11	22	210	135	44	154	19	
211660-1	820.8	4.59	0.76	5809	680	7.30	126	141	40	55	42	134	29	9	26	195	122	53	153	15	
211660-1	827.0	4.69	0.76	5572	658	7.13	110	119	37	52	31	126	29	11	20	208	130	46	159	19	3
211660-1	830.5	4.38	0.72	5405	741	6.94	127	124	39	44	33	127	29	12	22	221	124	47	158	14	1
211660-1	834.1	4.36	0.82	5352	831	6.65	134	102	33	46	28	123	28	10	20	206	135	46	179	21	2
211660-1	837.8	4.34	0.82	5294	855	6.66	134	114	30	52	33	123	25	13	22	216	130	64	180	23	
211660-1	841.3	4.19	0.80	5300	824	6.54	135	144	32	46	28	117	27	19	21	211	111	55	165	15	
211660-1	844.8	4.21	0.72	5100	769	6.75	151	87	38	47	28	123	25	10	26	221	126	50	159	18	
211660-1	848.5	4.36	0.73	5295	826	6.75	115	129	27	51	35	125	28	18	22	224	123	50	159	15	
211660-1	852.1	4.27	0.77	5083	802	6.43	120	136	28	48	27	124	26	12	19	219	127	48	169	16	
211660-1	855.2	4.44	0.92	5019	853	6.57	136	112	32	48	33	120	28	5	18	204	126	46	163	13	1
211660-1	859.2	4.29	1.37	4994	845	6.48	173	101	35	54	30	124	26	15	23	211	122	37	151	11	5
211660-1	862.8	4.42	1.13	5126	894	6.65	157	134	33	53	23	119	26	15	22	210	125	50	155	15	
211660-1	866.4	4.29	1.05	5113	872	6.47	174	152	31	50	24	121	27	3	19	191	124	53	159	17	
211660-1	870.0	4.14	1.23	4913	942	6.30	114	71	32	53	29	122	26	18	24	200	126	51	173	18	
211660-1	873.5	4.33	1.00	4794	829	6.53	130	128	32	59	32	121	28	21	20	211	135	51	169	11	
211660-1	886.7	4.18	1.29	4787	875	6.30	128	124	32	47	31	119	28	6	25	183	125	50	156	14	

Core: GC4 North Central Basin Samples from paleomag. measurements

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
GC4	15.3	3.94	0.69	4917	1201	6.16	126	119	30	46	32	149	25	14	68	195	140	32	122	18	2
GC4	18.5	3.69	0.70	4848	1181	5.71	137	70	26	49	33	139	27	4	67	170	108	32	110	16	
GC4	24.5	3.77	0.66	4962	1119	5.92	143	124	26	46	35	136	26	15	66	200	123	29	118	10	4
GC4	27.5	3.90	0.66	4985	1075	5.96	117	90	30	50	35	132	26	10	74	205	134	35	121	15	7
GC4	30.6	3.76	0.68	4908	1069	6.11	164	154	30	51	37	129	26	9	74	207	142	39	135	23	
GC4	33.6	3.79	0.63	4794	1075	6.22	105	82	25	45	26	124	22	15	68	197	138	27	131	17	2
GC4	36.5	3.90	0.68	4862	1084	6.03	117	101	34	44	36	130	26	14	73	205	134	39	131	20	4
GC4	39.6	3.91	0.67	4935	1055	5.77	134	110	27	49	28	131	25	13	70	187	128	37	120	15	
GC4	42.7	3.95	0.66	5010	1136	5.93	170	138	26	51	32	128	24	1	66	176	125	25	116	16	1
GC4	45.6	3.72	0.65	4780	1189	6.26	107	116	28	54	25	127	23	10	64	184	129	29	116	13	9
GC4	48.8	3.76	0.64	4857	1024	5.93	163	170	21	45	28	121	27	14	61	183	124	16	103	11	
GC4	51.5	3.77	0.65	4528	1081	5.86	137	150	24	48	32	132	26	19	69	213	130	44	134	17	
GC4	54.4	3.66	0.64	4757	1056	5.82	124	98	27	54	39	135	24	1	80	202	152	32	139	20	
GC4	57.2	3.72	0.64	4930	1065	5.83	180	112	31	47	32	136	25	14	72	193	138	41	128	15	5
GC4	60.2	3.60	0.63	4552	1265	6.76	121	145	37	42	28	127	24	9	75	197	139	34	119	17	21
GC4	63.4	3.68	0.66	4917	1142	5.79	168	144	28	41	31	127	23	6	72	182	132	37	136	12	2
GC4	66.5	3.73	0.67	4731	1224	6.08	144	117	29	51	39	129	25	18	76	202	138	38	128	5	
GC4	69.4	3.88	0.70	4859	1484	6.70	150	168	30	49	31	130	26	15	74	204	143	29	123	18	5
GC4	72.1	3.62	0.69	4761	1390	6.02	134	101	27	56	35	127	23	5	74	209	134	33	117	17	
GC4	75.0	3.78	0.66	4588	1139	5.70	149	177	33	52	30	132	26	12	75	215	154	35	134	14	3
GC4	77.9	3.68	0.67	4690	1458	5.95	127	105	25	55	36	128	25	23	75	190	130	30	133	16	2
GC4	80.5	3.58	0.64	4345	2471	5.95	148	59	29	51	33	128	24	25	80	184	142	36	123	10	10
GC4	83.2	4.03	0.73	5082	2442	7.11	148	63	35	52	34	134	23	16	87	197	137	42	132	14	13
GC4	85.9	3.85	0.79	4911	1893	6.54	131	81	37	44	35	135	28	17	79	177	141	41	132	11	13
GC4	88.6	3.75	0.71	4936	1426	6.34	194	90	36	36	36	136	29	24	80	186	147	38	122	11	5
GC4	91.7	3.79	0.69	4810	1581	6.50	165	85	34	47	31	129	26	21	79	188	131	32	124	16	6
GC4	94.5	3.81	0.69	4621	1578	6.27	158	122	28	53	29	130	26	9	79	208	136	49	119	13	0
GC4	97.4	3.82	0.69	4627	1088	5.72	165	85	26	50	36	134	25	1	89	188	129	28	124	1	7
GC4	100.2	3.77	0.66	4950	1064	6.31	188	123	33	48	28	137	26	26	91	197	145	36	129	13	10
GC4	103.0	3.37	0.64	4493	857	5.97	154	139	27	40	38	125	26	20	88	152	102	31	103	18	12
GC4	105.7	3.27	0.62	3964	930	6.80	142	57	30	61	75	137	21	2	138	134	125	25	93	7	73
GC4	109.0	3.28	0.72	4051	1272	6.10	168	124	30	56	50	129	23	9	120	160	129	32	112	8	57
GC4	111.8	3.51	0.81	4425	1382	6.14	147	79	22	57	44	123	24	28	99	139	113	24	94	12	23
GC4	114.9	3.62	0.78	4632	2017	7.97	105	90	40	55	43	129	21	31	104	159	132	41	115	17	39
GC4	117.8	3.78	0.69	4918	1025	6.32	197	145	31	54	43	131	24	15	99	198	138	41	134	8	1
GC4	120.8	3.58	0.74	4454	1075	6.82	183	90	37	53	50	134	24	24	114	151	128	35	116	13	15
GC4	123.7	3.77	0.68	4985	1039	6.44	177	103	32	53	39	135	25	11	81	187	143	41	124	3	12
GC4	126.7	3.74	0.71	4912	1024	6.62	199	104	33	56	39	135	27	36	75	193	138	38	134	15	6
GC4	129.6	3.71	0.67	4818	1101	6.66	180	120	30	52	37	131	26	25	73	176	146	40	129	17	10
GC4	132.3	3.67	0.68	4752	974	6.30	166	86	33	42	27	126	26	26	65	179	141	42	120	11	6
GC4	135.2	3.87	0.70	4762	1016	6.12	104	118	27	42	27	124	27	16	55	163	125	31	109	11	3
GC4	138.3	5.37	0.95	6532	1591	8.36	167	112	46	49	42	158	34	24	82	210	148	43	140	17	2

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
GC4	141.0	3.81	0.67	4827	1080	6.11	135	119	32	41	28	125	27	15	58	196	120	28	127	14	3
GC4	144.0	4.12	0.73	4964	1092	6.41	115	92	33	46	26	130	26	15	71	218	148	44	134	8	0
GC4	146.7	3.54	0.64	4598	987	5.75	167	117	28	49	28	121	26	20	60	201	143	45	136	17	5
GC4	149.7	3.90	0.69	4891	1027	6.38	109	112	36	47	27	133	26	11	61	218	147	40	131	13	10
GC4	152.3	3.75	0.69	5034	984	6.09	127	123	29	51	25	128	26	19	61	194	142	45	121	14	
GC4	155.2	4.07	0.75	5081	1011	6.52	163	141	35	47	27	128	26	27	64	214	140	39	137	14	2
GC4	158.1	3.90	0.73	4923	968	6.44	160	109	32	48	31	131	24	23	64	207	137	39	123	11	0
GC4	160.9	4.18	0.75	5307	1017	7.07	174	115	38	47	31	135	26	24	64	206	139	45	144	13	6
GC4	163.9	4.01	0.73	5012	969	6.53	128	145	33	52	35	136	25	26	66	209	147	41	125	17	3
GC4	166.9	3.96	0.71	5210	913	6.36	170	169	35	56	33	135	27	23	62	214	154	66	136	16	0
GC4	169.7	3.82	0.73	4852	918	6.61	152	106	36	47	30	126	23		66	210	147	39	145	19	8
GC4	172.7	3.97	0.74	5073	979	6.97	125	114	39	54	36	134	24	15	70	216	147	43	141	10	4
GC4	175.5	3.74	0.69	4898	845	6.48	160	114	31	51	28	130	24		60	198	157	43	131	6	
GC4	178.5	3.91	0.68	5069	826	6.23	188	103	29	48	29	127	26	18	61	209	156	44	140	14	2
GC4	181.3	3.92	0.71	4967	883	6.42	155	142	30	48	36	131	24	19	62	193	138	44	122	9	
GC4	184.1	3.90	0.72	5091	849	6.52	149	132	32	46	34	134	28	23	63	204	135	42	127	14	5
GC4	187.0	3.66	0.70	4700	827	6.66	191	77	28	51	32	124	25	30	61	192	149	49	142	25	2
GC4	189.8	3.69	0.69	4821	769	6.24	173	113	32	46	33	127	26	31	61	207	158	54	133	11	
GC4	192.6	3.19	0.63	4174	697	5.44	92	114	25	43	28	113	21	12	51	191	133	35	113	14	2
GC4	195.4	3.91	0.73	4854	915	6.56	144	118	34	51	35	134	24	12	60	199	138	43	121	11	4
GC4	198.4	4.03	0.70	4853	970	6.57	126	99	33	48	28	133	25	15	56	211	147	56	133	13	
GC4	201.1	4.09	0.72	4966	926	6.70	189	134	33	48	31	128	25	28	54	220	159	50	135	13	1
GC4	204.3	3.91	0.73	4931	928	6.73	115	104	31	52	31	131	23	3	60	210	153	43	142	21	5
GC4	207.2	4.10	0.74	4950	945	6.48	162	116	37	52	33	125	28	33	53	204	140	35	123	17	1
GC4	212.9	4.04	0.73	4911	942	6.54	120	137	30	51	33	129	26	12	54	192	139	43	127	15	9
GC4	215.6	3.95	0.69	4973	896	6.51	131	114	32	55	30	129	24	12	60	206	147	40	138	24	3
GC4	218.5	3.82	0.71	4877	931	6.56	138	137	35	52	31	128	22	22	60	220	151	42	137	16	4
GC4	221.0	3.74	0.67	4819	857	6.24	127	136	28	38	23	125	24		59	208	149	44	140	17	1
GC4	223.9	4.41	0.78	5540	1001	6.96	150	150	32	54	34	138	27	18	65	212	148	36	137	18	4
GC4	226.7	4.36	0.81	5434	970	6.94	178	133	32	53	34	135	27	7	58	209	150	49	144	18	
GC4	235.4	3.91	0.77	5235	873	6.67	213	112	29	47	30	133	24	16	55	212	140	45	132	19	0
GC4	238.3	4.00	0.74	5091	800	6.49	136	103	31	54	28	133	27	16	58	196	142	47	137	12	0
GC4	241.5	4.02	0.75	4829	849	6.49	175	91	34	51	27	126	25	1	59	198	141	44	129	15	4
GC4	244.5	3.92	0.70	4971	927	6.70	192	87	30	52	30	134	25	8	57	198	137	38	136	17	
GC4	247.7	3.92	0.70	4797	1007	6.89	139	152	42	49	38	132	24	7	58	213	139	35	136	12	1
GC4	253.7	3.85	0.70	4870	1013	6.68	177	122	32	46	24	127	23	13	54	208	133	45	131	9	
GC4	257.0	3.90	0.69	4841	1005	6.58	133	106	34	49	34	124	25	10	55	189	147	36	130	12	
GC4	260.0	3.87	0.70	4781	975	6.33	116	98	41	52	33	130	24	5	56	218	144	40	141	16	4
GC4	262.2	3.83	0.68	4855	1020	6.34	114	119	33	44	30	128	21	3	54	190	142	38	126	9	7
GC4	263.1	3.76	0.71	4686	1059	6.52	127	124	33	46	30	124	24	10	52	200	146	39	136	16	
GC4	274.8	4.14	0.75	5176	1023	6.90	141	106	34	57	29	134	26	18	55	215	145	43	140	14	4
GC4	283.6	3.95	0.70	4828	946	6.19	161	89	30	54	27	127	25	15	55	218	153	42	136	16	2
GC4	286.4	4.05	0.71	5051	888	6.13	168	152	31	51	39	130	25	12	55	212	145	33	141	15	3
GC4	289.2	3.81	0.69	4937	982	6.27	186	162	31	50	32	127	26	12	57	206	152	33	136	16	5
GC4	291.8	3.87	0.69	4961	1010	6.37	165	119	29	54	28	128	24	20	55	190	133	42	117	7	2

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
GC4	294.6	3.90	0.72	4820	895	6.32	168	132	34	55	34	129	24	16	49	209	127	20	121	15	2
GC4	297.4	4.01	0.72	4909	926	6.30	151	133	29	53	30	128	26	17	50	191	135	35	130	17	6
GC4	300.1	3.93	0.73	4985	922	6.46	111	151	32	48	28	128	26	20	51	208	127	39	127	12	1
GC4	302.7	3.80	0.71	4911	919	6.34	139	112	35	56	37	129	26	21	58	209	140	38	129	13	4
GC4	308.1	3.92	0.72	5118	930	6.50	163	154	32	47	27	132	24	8	50	213	142	36	125	20	2
GC4	311.0	3.95	0.75	5300	966	6.67	134	160	32	43	30	133	28	23	48	238	156	40	139	18	5
GC4	313.5	4.16	0.79	5277	883	6.65	174	99	31	49	29	131	26	27	47	198	138	37	133	13	5
GC4	316.6	4.03	0.73	5111	858	6.63	158	108	34	51	34	135	27	16	52	214	157	44	135	20	1
GC4	319.2	3.86	0.73	5061	840	6.47	153	91	35	52	36	132	26	10	54	216	153	33	144	15	
GC4	322.0	3.98	0.72	4891	841	6.53	133	91	30	52	35	133	27	10	52	202	137	41	133	14	4
GC4	324.7	3.89	0.70	5043	854	6.40	160	123	31	50	30	130	24	15	50	236	155	48	143	17	
GC4	327.5	4.21	0.78	5287	871	6.49	199	138	35	48	29	136	24	15	49	217	155	47	144	22	
GC4	330.1	4.07	0.75	4985	895	6.55	128	130	30	45	31	133	25	4	50	239	147	37	146	16	3
GC4	333.0	3.99	0.74	5017	970	6.79	206	139	34	53	33	129	25	11	52	213	139	32	127	15	6
GC4	336.0	4.03	0.74	5167	947	6.71	136	140	36	49	31	131	28	27	55	210	145	39	133	9	
GC4	343.8	4.07	0.73	4947	1069	6.57	142	84	34	49	32	131	24	21	52	207	142	39	142	23	5
GC4	349.9	4.03	0.71	5094	903	6.25	183	130	32	49	31	131	26	18	49	213	143	42	143	14	
GC4	352.6	4.79	0.84	5866	1070	7.22	221	166	35	59	40	145	28	16	58	216	141	47	149	23	2
GC4	355.3	3.77	0.67	4841	1081	6.58	107	115	34	47	35	131	25	17	54	194	150	42	142	18	
GC4	363.7	4.05	0.75	4989	1006	6.45	158	118	30	55	32	131	27	22	50	197	147	48	138	14	
GC4	366.6	4.06	0.79	4988	971	6.33	179	99	38	52	36	139	27	17	54	215	140	44	139	15	3
GC4	369.9	3.88	0.74	4991	897	6.01	158	121	31	44	29	129	24	7	50	211	131	39	123	14	4
GC4	372.4	4.10	0.73	5310	962	6.59	153	163	33	56	29	136	26	7	50	196	137	45	142	17	4
GC4	375.0	3.85	0.71	4945	939	6.24	168	140	29	48	34	128	26	18	47	213	142	51	139	7	4
GC4	377.7	3.94	0.72	5077	891	6.19	141	107	34	51	35	131	27	7	55	209	137	40	138	15	
GC4	383.1	3.94	0.75	5402	937	6.44	146	132	30	53	36	139	25	9	53	234	149	57	149	16	1
GC4	386.1	3.92	0.75	5100	987	6.71	183	166	38	47	37	134	27	23	56	211	144	45	146	23	7
GC4	388.7	4.04	0.75	5152	1048	7.22	152	98	41	43	32	126	26	31	51	223	142	44	135	10	9
GC4	391.3	4.00	0.73	5295	968	6.43	169	124	32	43	30	134	26	12	50	208	135	47	141	10	3
GC4	394.1	3.95	0.77	5197	1034	6.72	218	118	35	45	35	136	26	13	56	195	130	46	135	11	2
GC4	399.6	4.24	0.73	5349	1138	7.12	203	98	41	47	40	132	29	27	56	197	130	43	136	17	3
GC4	402.5	3.93	0.73	5085	1054	6.31	202	132	33	47	34	132	28	17	53	212	144	44	139	14	
GC4	408.0	3.88	0.71	5055	954	6.65	159	145	34	51	40	134	25	29	69	202	134	34	142	16	10
GC4	410.5	3.72	0.72	5068	937	7.38	196	105	40	60	49	133	23	21	80	184	135	41	124	11	21
GC4	413.2	3.61	0.75	4912	1138	7.56	222	60	36	71	90	135	23	30	106	172	147	34	129	13	74
GC4	416.2	3.70	0.77	4881	1235	7.37	232	116	43	71	86	133	22	22	101	191	148	45	124	12	103
GC4	427.5	4.01	0.74	5062	1031	6.79	163	103	34	62	46	134	25	19	68	207	146	52	138	13	18
GC4	430.3	3.99	0.76	4931	1191	7.27	236	121	38	59	57	131	27	23	74	184	142	36	127	16	30
GC4	433.0	4.10	0.77	5017	1273	7.14	193	106	39	64	57	135	27	36	70	205	140	48	125	14	23
GC4	435.9	3.99	0.72	5119	1443	6.55	213	119	32	50	29	130	27	19	38	202	138	46	133	8	5
GC4	438.5	4.08	0.83	4960	4950	6.79	150	108	32	52	41	131	27	21	38	201	137	48	131	12	4
GC4	441.4	3.85	0.69	4928	2544	6.40	143	155	33	58	38	136	25	22	40	219	144	52	133	16	4
GC4	444.0	4.01	0.74	4718	2746	6.70	146	94	29	54	30	134	24	2	36	214	145	45	129	11	7

Core	Depth cm	K (%)	Ca (%)	Ti mg/kg	Mn mg/kg	Fe (%)	V mg/kg	Cr mg/kg	Co mg/kg	Ni mg/kg	Cu mg/kg	Zn mg/kg	Ga mg/kg	As mg/kg	Br mg/kg	Rb mg/kg	Sr mg/kg	Y mg/kg	Zr mg/kg	Nb mg/kg	Mo mg/kg
GC4	449.5	4.42	0.79	5419	1574	7.20	163	128	34	51	38	142	27	14	48	212	149	46	139	20	6
GC4	457.9	4.02	0.72	4915	2143	6.66	142	118	31	51	31	125	25	8	36	185	139	41	126	17	13
GC4	460.7	3.88	0.75	4752	3038	6.47	141	123	29	54	32	127	23	17	39	198	137	40	130	14	10
GC4	463.5	3.76	0.70	4735	2482	6.31	158	104	27	54	31	127	25	13	44	191	143	47	122	10	7
GC4	466.1	3.91	0.74	4771	2493	6.37	156	112	31	60	43	130	26	21	45	197	133	46	126	13	12
GC4	469.0	3.89	0.75	4657	2127	6.97	164	76	37	61	39	127	26	16	48	192	148	45	124	6	18
GC4	472.0	3.74	0.82	4328	1522	6.91	173	118	37	70	62	131	25	31	68	177	125	40	128	8	56
GC4	474.5	3.93	0.86	4749	5451	7.88	181	104	44	83	74	134	24	22	64	169	127	41	115	10	105
GC4	477.4	3.94	0.83	4727	8532	6.21	98	55	24	54	39	125	25	9	42	200	141	48	124	18	11
GC4	486.2	4.00	0.80	4586	6476	5.99	134	126	30	57	50	130	26	17	52	196	146	46	128	10	18
GC4	489.0	3.99	0.85	4577	9515	6.22	123	99	24	57	48	129	26	30	46	209	151	46	137	17	15
GC4	492.0	3.96	0.71	4880	2939	6.32	128	117	35	52	50	132	25	17	50	197	133	38	142	19	24
GC4	494.6	3.90	0.75	4636	5201	6.43	113	94	32	59	44	122	22	15	49	197	132	42	127	15	17
GC4	497.5	3.84	0.76	4621	5776	6.07	120	87	28	57	46	119	24	15	42	188	129	38	110	13	4
GC4	500.4	4.51	0.81	5574	1790	6.12	173	155	24	53	55	139	27	6	51	212	155	44	149	10	2
GC4	507.0	3.82	0.66	4733	1435	5.75	97	102	23	57	48	125	24	1	47	212	138	37	132	16	1
GC4	510.0	3.92	0.64	4620	1122	5.41	99	115	33	57	51	122	27		45	225	152	50	151	14	
GC4	521.0	4.10	0.69	4856	962	5.58	179	136	28	45	43	122	25	15	36	187	146	43	130	13	
GC4	525.2	4.02	0.68	4517	740	5.62	97	102	25	49	46	129	26	23	40	199	149	40	140	17	1
GC4	528.9	3.82	0.71	4265	650	7.26	117	100	35	48	40	113	24	5	33	181	144	40	115	12	2
GC4	532.5	3.49	0.63	3941	666	5.29	99	151	29	44	44	113	26	7	31	186	142	40	118	11	
GC4	539.6	4.00	0.67	4375	682	5.94	120	110	27	54	41	122	24	5	33	200	145	39	130	11	5
GC4	543.4	3.90	0.66	4293	629	6.31	110	146	36	41	38	116	26	10	32	203	148	35	130	9	

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Dating and assessing the recent sediments of three deep basins of the Baltic Sea: Indication of natural and anthropogenic changes

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Abstract (max. 2000 characters)

A 3-years EU-MAST-3 project (Baltic Sea System Study, BASYS) recovered short and long sediment cores from 3 deep basins of the Baltic Sea (Bornholm Basin, Gotland Basin and North Central Basin). During a paleoenvironmental study, lead-210 dating and geochemical data were generated.Dating of cores from the Bornholm Basin suggests disturbed sediment surfaces probably caused by human activity. Sedimentation rates are in excess of 5 mm/a. Sediments from the North Central Basin have rates, between 3 and 5 mm/a, while the rates for the Gotland Basin are at 2-3 mm/a.

Ca-Mn accumulations are ascribed to rhodochrosite formation which is thought to be coupled to saltwater inflows in that oxygen and HCO_3^- rich saltwater converts bacterially re-dissolved Mn into the carbonate mineral. There is a clear indication for cyclic rhodochrosite deposition in that about 300 year long periods with relatively high Ca-Mn are followed by about 300 years lasting sections with low Ca-Mn.

Mo accumulations with peak values exceeding 300 mg/kg are found in all cores. The Mo transport to the seafloor is thought to be coupled with the nitrogen fixation processes by cyanobacteria being known for their need of Mo as central element in the nitrogen fixing enzyme. Mo is finally settling with biogenic remains or in remnants of their grazers.

A different model of the formation of laminated and homogeneous sediments in the Baltic Sea is proposed. A well-stratified water column and sufficient supply of nutrients leads to algal blooming in the central Baltic which however reqire a distinct and relatively constant salinity range. Blooming periods generate finely laminated sediments by settling of larger flocs of biogenic remains on the seafloor. Under normal conditions (increased windforcing), a relatively thick and well-ventilated surface water layer is formed with normal primary production. Particle transport to the seafloor is then restricted and more homogeneous sediments are deposited.

AGE ESTIMATION, ALGEA, CALCIUM, BALTIC SEA, CESIUM 137, CYANOBACTERIA, GEOCHEMISTRY, LEAD 210, MANGAN, MOLYBDENUM, PALEOCLIMOTOLOGY, SEDIMENTS, SEDIMENTATION, X-RAY-FLUORESCENCE ANALYSIS

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